

# Restoration of *Unio crassus* rivers in the Luxemburgish Ardennes LIFE11 NAT/LU/857



March 1<sup>st</sup> 2016 –  
February 28<sup>th</sup>  
2017

## Progress Report III



LE GOUVERNEMENT  
DU GRAND-DUCHÉ DE LUXEMBOURG  
Ministère du Développement durable  
et des Infrastructures  
Département de l'environnement



LE GOUVERNEMENT  
DU GRAND-DUCHÉ DE LUXEMBOURG  
Ministère de l'Agriculture,  
de la Viticulture et de la  
Protection des consommateurs



## LIFE11 NAT/LU/000857

### Progress Report III

1<sup>st</sup> March 2016 to 28<sup>th</sup> February 2017

Reporting Date

**28th February 2017**

## « Restoration of Unio crassus rivers in the Luxemburgish Ardennes » LIFE Resto-unio

|                              |  |
|------------------------------|--|
| <b>Project location:</b>     | Vallée de l'Our de Ouren à Dasburg Pont LU0001002<br>Vallée Supérieure de la Sûre / Lac du barrage LU0001007 |
| <b>Project start date:</b>   | 01.09.2012   |
| <b>Project end date:</b>     | 28.02.2019   |
| <b>Total budget</b>          | 2.057.068 €  |
| <b>EC contribution:</b>      | 1.028.534 €  |
| <b>(%) of eligible costs</b> | 50 %   |

#### Data Beneficiary

|                         |  |
|-------------------------|--|
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## 2 LIST OF ABBREVIATIONS

|        |   |
|--------|---|
| MA:    | Ministère de l'Agriculture, de la Viticulture et du Développement rural |
| MDDI:  | Ministère du Développement durable et des infrastructures               |
| MIGR:  | Ministère de l'Intérieur et à la Grande Région                          |
| FMCS:  | Freshwater Mollusk Conservation Society                                 |
| U. c.: | <i>Unio crassus</i>   |
| WFD:   | Water Framework Directive   |
| AGE:   | Administration de la Gestion de l'Eau                                   |
| ANF:   | Administration de la Nature et des Forêts                               |
| ASTA:  | Administration des Services Techniques de l'Agriculture                 |
| M.m.:  | <i>Margaritifera margaritifera</i>                                      |
| PDR:   | Plan de Développement rural   |
| RDP:   | Rural Development Programme   |
| AEM:   | Agri Environment Measures   |
| LIST:  | Luxembourg Institute of Science and Technology                          |
| QD:    | Qualifizieren-Dimensionieren  |

### 3 SUMMARY

#### 3.1 General progress and assessment

|  |   |
|--|---|
| <b>Action A1: Localisation des zones à risques d'érosion</b>   |   |
| Progress: After the mapping of the main hotspots of sediments a list has been set up.  | To realise till next report: The action is finished.  |
| <b>Action A2: Planification des mesures de restauration</b>  |   |
| Progress: A restoration measure plan has been set up. It's the base for the measures to be done in the project.  | To realise till next report: The action is finished.  |
| <b>Action A3: Planification de la surveillance de la qualité de l'eau et du substrat interstitiel</b>  |   |
| Progress: Sampling points were chosen, Sampling equipment has been bought and installed on both river basins, Our and Sûre.  | To realise till next report: The action is finished.  |
| <b>Action A4: Mise en place de la technique d'élevage pour <i>Unio crassus</i></b>   |   |
| Progress: All the permissions are available. The exchanges with American specialists was done. A rearing protocol in German and English has been written.  | To realise till next report: The action is finished.  |
| <b>Action A5: Contribution à l'élaboration des plans de gestion Natura 2000 "Our" et "Haute Sûre"</b>  |   |
| Progress: The management plans for the Natura 2000 sires Our and Haut-Sûre are definitive.   | Publication of "arrêté ministériel" is foreseen in spring 2017  |
| <b>Action B1: Acquisition de terrains le long de l'Our, de la Sûre et de leurs affluents</b>   |   |
| Progress: Land purchase of 790,23 are (98,8 %).  | To realise till next report: Continue land purchase.  |
| <b>Action C1: Interventions pour réduire l'apport en sédiments fins dans le réseau hydrographique</b>  |   |
| Progres: <ul style="list-style-type: none"> <li>• 1.615 m have been built, 8 watering places created, 4 cattle passages built.</li> <li>• AEM done: 2 contracts for biodiversity</li> <li>• Installing of water evacuation grids: 39</li> <li>• Restoration of the riverbed "Feierbech" 100 m</li> </ul> | To realise till next report: <ul style="list-style-type: none"> <li>• Installing fence</li> <li>• AEM measures!</li> <li>• Installing water evacuation grids</li> <li>• Restoration of the riverbed "Roderbaach" 100 m</li> </ul> |

|   |  |
|---|--|
| <b>Action C2: Transformation d'obstacles à la migration des poissons sur les cours d'eau tributaires</b>  |  |
| Progress: 4 fish obstacles are meanwhile transformed. 2 are planned   | To realise till next report: Finalise the planning and execute the foreseen measures.  |
| <b>Action C3: Amélioration du substrat par dépôt de gravier</b>   |  |
| Progress: The yearly dumps of gravel on Our (108,78 m <sup>3</sup> ) and Sûre (116,33 m <sup>3</sup> ) have been done.  | To realise till next report: Add 100 m <sup>3</sup> gravel to the river Sûre.  |
| <b>Action C4: Elevage de <i>Unio crassus</i> pour la Grande Région</b>  |  |
| Progress: 1.750 minnow were infested with <i>U. c.</i> larvae, 63.000 juvenile mussels collected. Larger sand trays with automatic feeding were tried but need to be optimized. More mussel were transferred to the outside rearing channel   | To realise till next report: Start all the necessary preparations for fish infestation. Continue culture with the mussels from the previous years, and collect new mussels. Optimize automatic feeding system to culture higher numbers of mussels |
| <b>Action C5: Régulation de la prédation du rat musqué</b>  |  |
| Progress: 41 muskrats have been trapped on the river Our, 26 on the river Sûre.   | To realise till next report: The muskrats are captured all over the year.  |
| <b>Action D1: Surveillance de la qualité de l'eau et du substrat interstitiel</b>   |  |
| Progress: Measuring of water quality and turbidity continues at both catchments and in their tributaries. (631 samples). The piloting committee was informed about problematic points.  | To realise till next report: Continue the monitoring of the water quality and the interstitial.  |
| <b>Action D2: Monitoring des poissons hôte</b>  |  |
| Progress: Electric fishing activities at the tributaries in the catchment of the river Our and Sûre were done in December 2016. The transformed fish migration obstacles were analyzed.   | To realise till next report: Electric fishing on the main stream in spring/summer 2017.  |
| <b>Action D3: Suivi de <i>Unio crassus</i> dans son milieu naturel</b>  |  |
| <p>Progress: Monitoring of 26,2 km (87%) on the river Our and 12,5 km (69%) on the river Sûre.</p> <ul style="list-style-type: none"> <li>• Mean density: 0,03 ind/m<sup>2</sup></li> <li>• Survival rate of the tagged mussels: between 85% and 100%</li> <li>• Fertility control has been done</li> </ul> | To realise till next report: Continue mussel monitoring. Control of the tagged mussels. Sampling and analysis of the sediment fractions on the mussel banks. Supervise the released mussels.   |

|  |  |
|--|--|
| <b>Action D4: Monitoring et évaluation de l'impact des mesures concrètes</b>   |  |
| Progress: The success of the restoration measures is evaluated by the following indicators: water quality, quality of substrate and host fish population.  | To realise till next report: Continue the monitoring of the impact.  |
| <b>Action D5: Analyse de l'impact socio-économique du projet et de l'effet sur les écosystèmes</b>   |  |
| Progress: The socio economic study was outsourced to the LIST. First meetings took place and relevant data was exchanged.  | To realise till next report: Closely follow the progress of the study and provide all the necessary information's.   |
| <b>Action E1: Information et sensibilisation des acteurs concernés</b>   |  |
| Progress: <ul style="list-style-type: none"> <li>planning of the two information events for farmers</li> <li>40 meetings with authorities and stakeholder</li> </ul>   | To realise till next report: <ul style="list-style-type: none"> <li>Organize the next farmer information event</li> <li>Organize water forum for the river Our and Sûre catchments</li> <li>Stay in contact with stakeholders</li> </ul> |
| <b>Action E2: Sensibilisation du grand-public</b>  |  |
| Progress: <ul style="list-style-type: none"> <li>Visit of 1052 persons at the mill + 670 people informed during 5 other events</li> <li>Press release: 15 articles</li> <li>Film: film footage and film animations done</li> <li>Content of two notice boards done</li> <li>Installation of the Natura 2000 room finished</li> </ul> | To realise till next report: <ul style="list-style-type: none"> <li>Continue with press releases and visits</li> <li>Finish project movie</li> <li>Installation of A0 information boards</li> </ul>                                      |
| <b>Action E3: Création d'un site Web</b>   |  |
| Progress: Website fully accessible in all three languages (FR, EN and DE). About 510 visitors per month.   | Keep internet site up to date with news and downloads.   |
| <b>Action E4: Organisation de séminaires</b>   |  |
| Progress: First seminar took place in November 2015 (about 80 persons from 20 nations)   | To realise till next report: Start organizing the second seminar about restoration measures.   |
| <b>Action F1: Gestion et encadrement du projet</b>   |  |
| Progress: Fifth piloting committee. Writing of the Progress report. Project prolongation till 28 <sup>th</sup> February 2019 has been accepted   | To realise till next report: sixth piloting committee. Writing of the Progress report.   |



|  |   |
|--|---|
| <b>Action F2: Echange du savoir avec d'autres projets: LIFE et autres</b>  |   |
| Progress: Constant exchange with colleagues working in Mussel-Projects by email and phone. Presentation of the project at the international meetings in Sweden | To realise till next report: Continue exchange with Life and freshwater mussel projects and others. Participate at scientific seminars (FMCS Meeting in Cleveland, March 2017). |
| <b>Action F3: Plan de conservation After-LIFE</b>  |   |
| Progress: Not scheduled for the moment.  | To realise till next report: Not scheduled for the moment.  |

### 3.2 Problems encountered

- Technical aspect

A delay occurred concerning the negotiation of AEM measures. We and our partner the "Chambre de l'agriculture" needed the official announcement of the national agrarian legislation to conclude agri-environmental agreements. The Luxemburgish Government was supposed to finish and publish the national law in spring 2016. But the law only has been officialised in the "Memorial" on the 3thrd August 2016 and we got the programme of the AEM measures in September so that we were not able to conclude contracts in 2016 as the deadline is the first August. The first contracts will be concluded in 2017.

But in order to progress on this subject, we contacted both Nature Parks of Our and Sûre to select agricultural land where biodiversity contracts with farmers will be negotiated in 2017. With the help of the National Chamber of Agriculture we plan to set up AEM measures for the hot spots of erosion on farmland listed in the "Restoration measure plan" sent to CE on 30.06.2014.

The pilot project on the small catchment Feierbech which started in January 2015 is still ongoing. It is not a direct solution to the specific problem detailed above, but the results of this project will help us in determining AEM measures and the sensitization effect of the farmers via this project is given (see C1).

- Financial aspect

The negotiations around the PDR and the absence of a national agrarian legislation delayed the conclusions of the agri-environmental agreements and the installation of water evacuation grids on rural and forestry ways in the project. Thanks to budget savings in the "Other costs", "Equipment" and "Personnel" financial categories (86.938 €) the project submitted on 27/05/2016 a request for prolongation, which was granted by the EC on 21.07.2016.

The coordinator Alexandra Arendt has been asked to support other projects in our NGO. Therefore, starting from January 2017, she will only work on the LIFE RestoUnio project upon request. The coordination moved to Sonja Heumann who will then increase her weekly working time from 20 to 28hours/week beginning from February 2017. An additional person will soon be hired in order to support the implementation of the AEM in the next 2 years (see □).

## 4 ADMINISTRATIVE PART

### 4.1 Project management

The setup of the project management and composition of the project team is described under Action F1. Meetings with stakeholder or other groups and persons relevant for the project management are always mentioned in the respective description of the action (see chapter 5).

### 4.2 Organigramme

#### 4.2.1 March 2016 to December 2016

- Constitution of the project team:
  - Coordinator 60%: Alexandra Arendt biologist
  - Scientific 1 50%: Frankie Thielen Dr. rer. nat and 50% on another non EU project
  - Scientific 2 50%: Sonja Heumann Dr. tech.
  - Technician 100%: Léo Klein environmental technician, left in December 2014, is replaced by Karin Michels from January 2015
  - Employee 20%: Tanja Eybe biologist
  - Secretary/accountancy: Patricia Heinen secretary 40% (LIFE 11 NAT/LU/857) 20% (LIFE 11 NAT/LU/858) 20%(LIFE 13 NAT/LU/ 782)
- Allocation of the different missions to each team member:
  - Alexandra Arendt is charged with the coordination of the project, the realisation of measures in the agricultural context.
  - Frankie Thielen and Karin Michels are responsible for the rearing station and the tasks related to the mussel breeding.
  - Sonja Heumann's principal mission is the water quality survey, the monitoring of the measures and the realisation of measures.
  - Tanja Eybe is charged with public relations, e.g. Natura 2000 room.
  - Patricia Heinen deals with accounting, timesheets and correspondence.
  - Each team member contributes in informing the public. Whenever an action needs higher personal input the other members will give the needed support.
- Every Monday 15 minutes team meeting: information about the happenings for the coming week (meetings, field work, help needed for special tasks...).
- Monthly team meetings (1 to 2 hours): review of the task's progresses, discussion of problems, working out of solutions. Written reports.
- Monthly meeting with the Fondation Hëllef fir d' Naturs' director: validation of work content and proceeding. Written reports.
- Monthly meeting between the director and the administrative council of Fondation Hëllef fir d'Natur. If necessary aspects dealing with the Life Unio project are mentioned. Written reports.
- Meetings with stakeholders or other groups and people relevant for the project management are always mentioned in the respective description of the action (see chapter 5).

#### 4.2.2 January 2017 to February 2017

There was a change in the organigramme in January 2017.

- Constitution of the project team:
  - Coordinator 70%: Sonja Heumann Dr. tech.
  - Scientific 1 50%: Frankie Thielen Dr. rer. nat and 50% on another non EU project
  - Scientific 2 100%: No Name
  - Technician 100%: Léo Klein environmental technician, left in December 2014, is replaced by Karin Michels from January 2015
  - Employee 20% Tanja Eybe biologist
  - Secretary/accountancy: Patricia Heinen secretary 40% (LIFE 11 NAT/LU/857) 20% (LIFE 11 NAT/LU/858) 20%(LIFE 13 NAT/LU/ 782)
  
- Allocation of the different missions to each team member:
  - Sonja Heumann is charged with the coordination of the project, the water quality survey, the monitoring of the measures and the realisation of measures
  - Frankie Thielen and Karin Michels are responsible for the rearing station and the tasks related to the mussel breeding.
  - No Name.'s principal mission will be the realisation of measures in the agricultural context.
  - Tanja Eybe is charged with public relations, e.g. Natura 2000 room.
  - Patricia Heinen deals with accounting, timesheets and correspondence.
  - Each team member contributes in informing the public. Whenever an action needs higher personal input the other members will give the needed support.

The project Organigramme is the following (see Figure 1):

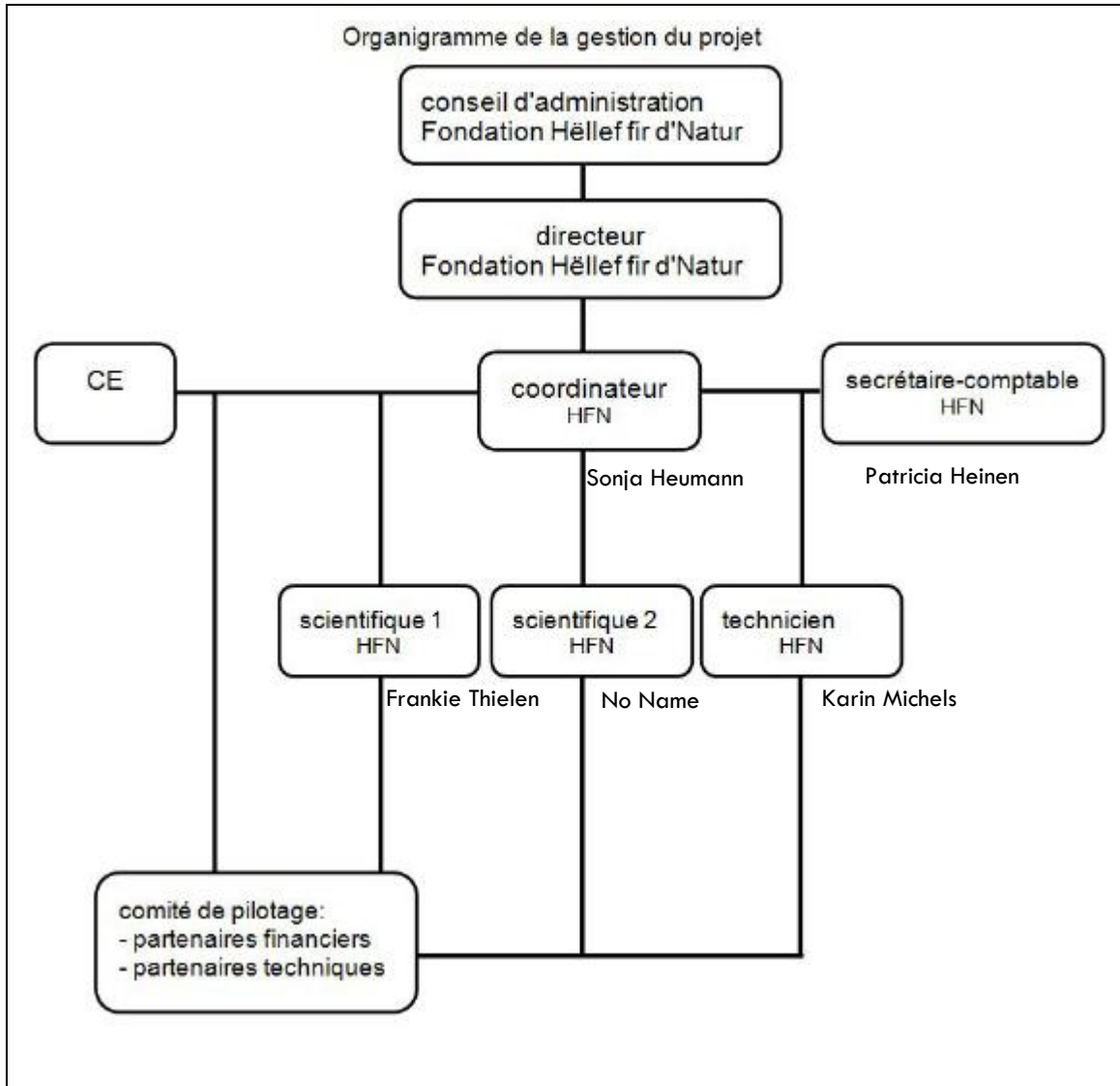


Figure 1 : Project Organigramme

- An amendment to the Grant Agreement has been necessary because the project submitted on 27/05/2016 a request for prolongation, which was granted by the EC on 21.07.2016. The end of the project will be the 28.02.2019
- The first march 2015 natur&ëmwelt-Fondation Hëllef fir d'Natur got a new president, namely Mr. Patrick Losch.
- The Partnership agreements with MA and MDDI have been submitted with the Inception report while the one with MIGR has been submitted with the Progress report.

### 4.3 Delivered Reports

The inception report has been delivered on 28th February 2013

The first progress report has been delivered on 28th February 2014

The mid-term report has been delivered on 28th February 2015

The second progress report has been delivered on 29<sup>th</sup> February 2016.

## 5 TECHNICAL PART

### 5.1 General progress of the actions

#### 5.1.1 Action A1: Localisation des zone à risques d'érosion

The load of fine sediments and nutrients in the river system is one of the main factors responsible for the decline of *Unio crassus*. Therefore, the project focuses on the reduction of the entrance of fine sediments and nutrients in the water courses, especially in the tributaries of the rivers Our and Sûre. The main intent of this action is to localize the hot spots of erosion.

##### ➤ Progress/results

For both river basins a mapping of the main different entrances of fine sediment into the water courses (erosion of and on farmland, erosion on or beside forestry and rural roads, spruce trees next to the river, cattle trampling, etc.) has been done.

The hotspots have been identified, evaluated, rated and priority lists have been set up for all types of entrances of fine sediment into the water courses (see action A2 submitted with the Mid-term Report).

The action is finished.

For the final report the list of the hotspots will be revised. The non solved spots or the new locations which cause problems will be part of the After-Life conservation plan.

##### ➤ Realised

List of hot spots of erosion.

##### ➤ Problems encountered/delays

No major problem.

Slight delay for the action; however the mapping was finished in May 2014 so that we could send our "Erosion report" on 30th June 2014 to the European Commission (see action A2).

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| A1 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

**5.1.2 Action A2: Planification des mesures de restauration**

The initial mapping phase of “hot spots” of erosion, as foreseen under the action A1, will allow deciding where negative points have to be resolved and will lead to the concrete planning phase of the following restoration measures:

- The installation of 2km of fences, 5 cattle watering installations, 3 bridges for cattle.
- Construction of 60 water evacuation systems on agricultural and forestry roads.
- 40 agro-environmental measures.
- Restoration of a river bed.

➤ **Progress/results**

A written document called the " Restoration measure plan" with priority lists has been set up and submitted to the CE on 30.06.2015. The priority lists contain detailed information on the detected problems, their localization, a link to [www.geoportail.lu](http://www.geoportail.lu) and a description of adapted restoration measures that could be realized during the project course. Furthermore the project has access to data related to owners or/and land users.

The action is finished.

➤ **Realised**

Restoration measure plan.

➤ **Problems encountered/delays**

No others problems or delays encountered.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| A2 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.



**5.1.3 Action A3: Planification de la surveillance de la qualité de l'eau et du substrat interstitial**

The planning of the water measurement stations and other equipment needed for water quality survey is part of this action.

➤ **Progress/results**

A redox-electrode (Geist & Auerswald, 2007) was delivered in January 2013. In March (04.03.2013) was a meeting in Munich combined with a workshop to learn the handling. In July 2014 another workshop was held at the river Our.

In June 2013 the company Hach-Lange installed 4 probes (nitrate, ammonium, chloride and potassium) at our Lab in Kalborn in order to see if the equipment would fit our needs. In August 2013 the whole equipment (nitrate, ammonium, chloride and potassium; conductivity, turbidity, oxygen and pH-value) was ordered and installed in September 2013.

A second system (OTT) was installed in March 2014. This is a mobile monitoring system with several parameters (temperature, pH value, oxygen, conductivity, turbidity and nitrate). It is used for the monitoring of Syrbaach (Sûre).

The action is finished.

➤ **Realised**

The redox-electrode was delivered. Data are available (D1 and D4).

Online monitoring system was installed at the Mill in Kalborn in September 2013. Data are available (D1)

Mobile monitoring system was delivered in March 2014. Data are available (Action D4).

➤ **Problems encountered/delays**

No problems or delays encountered.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| A3 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

**5.1.4 Action A4: Mise en place de la technique d'élevage pour *Unio crassus***

The intent of this action is to plan and organize all the necessary steps to install a culture procedure for *Unio crassus* at the rearing facility at the mill of Kalborn.

➤ **Progress/results**

Authorisation

All permission from the MDDI to handle *Unio crassus* in the river Our and Sûre were organized and is valid until February 28, 2018. A new permission for the remaining runtime of the project (February 2019) will be organized in 2017.

Developing and writing a rearing protocol

A rearing protocol including all the necessary steps for the culture of *Unio crassus*, including a discussion of the first results was written in German and is available online at our internet site ([www.unio.lu](http://www.unio.lu)) since August 2014 as planned.

Meanwhile we translated the rearing protocol in English which is now available on the website (see Annex 1).

➤ **Realised**

Permission Letter for the river Our and Sûre valid until 28.02.2018 (see Annex 4, progress report I).

- Visit of freshwater rearing facilities in the USA (18.-21.03.2013).
- Visit of an expert from the USA in Luxembourg (30.11 -01.12.2015).
- Technical document about rearing method in German (<http://www.unio.lu/files/55852.pdf>).
- Technical document about rearing method in English (<http://www.unio.lu/files/72719.pdf>)

➤ **Problems encountered/delays**

No problems encountered so far. The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| A4 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

**5.1.5 Action A5: Contribution à l'élaboration des plans de gestion Natura 2000 "Our" et "Haute Sûre"**

Contribution to the management plans for the 2 Natura 2000 project areas on the river Our and the river Sûre. The Life team will give scientific assistance to the consultant office in charge of working out the management plans. During public hearings the team will contribute with details about the aquatic biotope.

➤ **Progress/results**

Management plan Our: plan de gestion version abrégée.

- Official publication on the ministries internet site [emwelt.lu](http://emwelt.lu) since May 2016
- Publication of the "arrêté ministériel" foreseen in spring 2017

Management plan Sûre: plan de gestion version abrégée.

- Official publication on the ministries internet site [emwelt.lu](http://emwelt.lu) in January 2017
- Publication of the "arrêté ministériel" foreseen in spring 2017

With their clearly and precisely defined measures, both management plans will serve as an adopted base of the After Life Conservation plan.

➤ **Realised**

Management plan Our: plan de gestion version abrégée (definitive version) (see Annex 2).

Management plan Sûre: plan de gestion version abrégée (definitive version) (see Annex 3).

➤ **Problems encountered/delays**

No problems encountered so far.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| A5 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

**5.1.6 Action B1: Acquisition de terrains le long de l'Our, de la Sûre et de leurs affluents**

It is foreseen to acquire 8 ha of land on the catchment area of the river Our and the river Sûre.

➤ **Progress/results**

Land purchasing has been granted by a notary for 790,23 Are (98,8 %). For 353 Are the notarial acts are under progress. 683,43 Are have been bought on the catchment Our, 106,8 Are have been bought on the catchment Sûre. They are bought for a mean price of 81 €/Are (notarial deeds included).

Restoration measures have been done or are undergoing.

➤ **Realised**

Detail of land purchase, notarial act, aerial photo with the localisation of the acquisitions, explanation of the QD concept and enumeration of the measures done can be found in Annex 4.

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |          | 2013     |    |     |    | 2014     |          |     |    | 2015 |    |     |    | 2016     |          |     |    | 2017     |          |     |    |          |  |  |  |
|----|------|----|-----|----------|----------|----|-----|----|----------|----------|-----|----|------|----|-----|----|----------|----------|-----|----|----------|----------|-----|----|----------|--|--|--|
|    | I    | II | III | IV       | I        | II | III | IV | I        | II       | III | IV | I    | II | III | IV | I        | II       | III | IV | I        | II       | III | IV |          |  |  |  |
| B1 |      |    |     | planned  | planned  |    |     |    | planned  | planned  |     |    |      |    |     |    | planned  | planned  |     |    | planned  | planned  |     |    | planned  |  |  |  |
|    |      |    |     | realized | realized |    |     |    | realized | realized |     |    |      |    |     |    | realized | realized |     |    | realized | realized |     |    | realized |  |  |  |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

### 5.1.7 Action C1: Interventions pour réduire l'apport en sédiments fins dans le réseau hydrographique

This action will lead to:

- Installation of 2 km of fences, 5 cattle watering installations, 3 bridges for cattle.
- Construction of 60 water evacuation systems on agricultural and forestry roads.
- 40 agro-environmental measures
- Restoration of a river bed

#### ➤ Progress/results

Installation of fence (2.000m), watering tanks (5), cattles passage (3)

81% of the fencing has been done.

The targets will be reached within the foreseen budget without problem.

Table 1 : Measures realized and planned

| Catchment  | River         | Lieu-dit      | Fence (m)    | watering | cattle passage |
|------------|---------------|---------------|--------------|----------|----------------|
| Our        | Roupelsbaach  |               | 380          | 1        | 2              |
| Our        | Stroumbaach   | Folkesbour    | 650          | 2        | 0              |
| Our        | Stroumbaach   | Enkerich      | 500          | 2        | 2              |
| Our        | Bollertsbaach |               | 35           | 1        | 0              |
| Sûre -2017 | Syrbaach      |               | 50           | 2        | 0              |
|            |               | <b>Total:</b> | <b>1.615</b> | <b>8</b> | <b>4</b>       |

#### AEM (Mesures agri-environnementales)

The Luxemburgish PDR has been officialised in summer 2016 but has still officially not been published.

On 18.01.2017 we had a meeting with the national chamber of agriculture to become acquainted with the details of the different AEM measures and to discuss the approach in future. Intensive negotiations with farmers with the support of national chamber of agriculture will start in spring 2017.

#### Water evacuation grids

In the north of Luxembourg a lot of new windmills are built and the old are remounted. Therefore a lot of stone and other material is available and the local communities use this material to reconstruct their forestry roads. Therefore we could install many water evacuations grids on forest roads without the new PDR.

55 % of the planned grids installation has been done. 45% is under process and this action will probably be finished this year.



Table 2 : Agreements for water evacuation grids to be installed

| Catchment | River               | length (m)   | nb. of water evacuation grids - planned | done       |
|-----------|---------------------|--------------|---|------------|
| Sûre      | Schwaerzerbaach     | 600          | 6                                       | in process |
| Our       | Ruederbaach         | 500          | 5                                       | in process |
| Our       | Feierbech           | 1200         | 19                                      | 19         |
| Our       | Heinerscheiderbaach | 1800         | 20                                      | 20         |
| Our       | Huschterbaach       | 1500         | 15                                      | in process |
|           | <b>Total:</b>       | <b>5.600</b> | <b>65</b>                               | <b>39</b>  |

The grids on Ruederbaach, Schwärzerbaach and Huschterbaach will be installed in spring 2017 in combination with the fish obstacle removal.

Pilot project Feierbech

Figure 2 shows the pilot project area Feierbech.

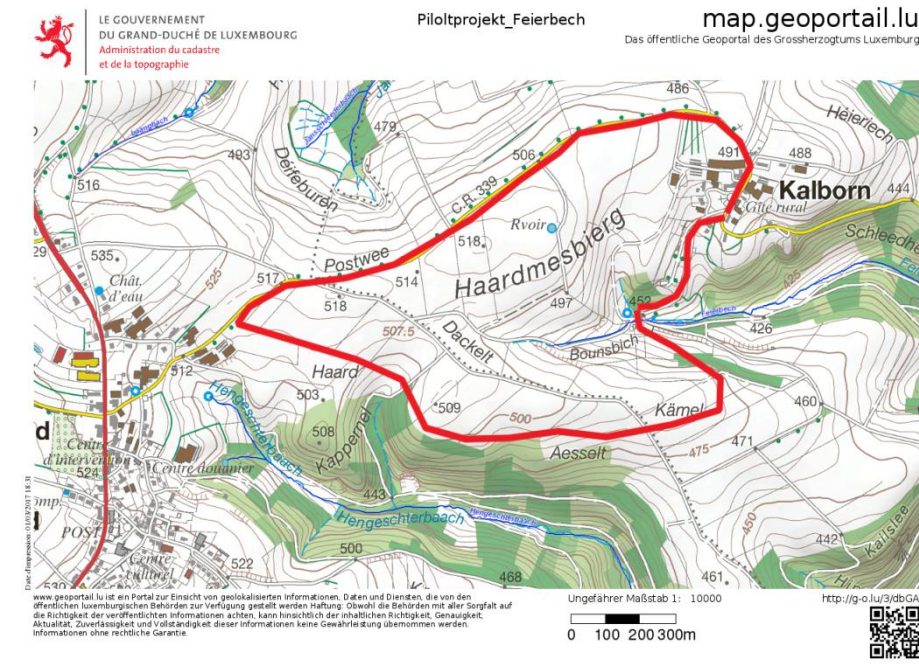


Figure 2: Pilot project area in the catchment area of Feierbech

In the catchment area of the Feierbech, a tributary of the Our river, soil samples were taken in max 30 cm deepness on 27 parcels in 2016. The goal was to know the concentration of nitrogen. The concentrations were quite low and led to the conclusion of good agricultural practices in that area. However, and as no link could have been done with the high concentrations detected in the water samples, the counsellors of the national agriculture chamber recommended us to take samples in 30, 60 and 90 cm deepness. This has been done on 3 parcels. We noticed that the concentration of nitrogen where highest at 90 cm. The project team will continue the soil monitoring.

We organized meetings in February 2015 and March 2016. We informed the farmers about our project and the impact of agriculture on the water.

The next meeting with the farmers, with a focus on AEM measures, will take place in March 2017. See also Annex 5.

Restoration of riverbed

We had a meeting with the ANF (21.11.2016) in order to plan a restoration measure on the Ruederbaach. This restoration measures will take place on a parcel which belongs to natur&ëmwelt Fondation Hëllef fir d'Natur. It will be a project together with the Administrations of Nature, Water and the local community Clervaux. The project includes a bridge, rerouting of the stream into its old riverbed, the reconstruction of the forestry road and installation of water evacuations grid.

At the river Feierbech the project restored the riverbed in April 2015. In December 2016 the Administration of Water removed the remaining tube, built a bridge and reconstructed the riverbed next to bridge. A summary of this project can be found in the Annex 6.

➤ **Realised**

Pilot Project "Feierbech" (see Annex 5)

Restoration of the river bed on lower part of the Feierbech (see Annex 6)

➤ **Problems encountered/delays**

Slight delay but no problems encountered so far.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| C1 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
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|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

Building of 500 m a fence on a tributary of the brook Traesbech

The measure has been planned by the Biological Station of the Natur Park Our together with the Life team and financed by the community Parc Housen, see plan under Annex 7.

Restoration of the riverbed (Feierbech)

The total amount of the restoration of the Feierbech riverbed, the transformation of the fish obstacle and the adaption of the access to the camping "Tintesmillen" were about 55.000 €. The transformation has been finished December 2016 (Annex 6).

### 5.1.8 Action C2: Transformation d'obstacles à la migration des poissons sur les cours d'eau tributaires

The intention of this action is to remove or transform 6 migration obstacles for fish in order to make them passable again.

#### ➤ Progress/results

Set up of a priority list for the fish obstacles that has been sent to the Water administration to plan the measures. Together with Administration of Water, Administration of Forest and Nature and the local forest ranger we decided which obstacles should finally be removed or transformed.

Three obstacles have been removed or transformed the years before (see Table 3). Last year we removed one obstacle at the tributary "Schwärzerbaach" and we planned two further construction sites in the catchment area of the river Our (Ruederbaach, Huschterbaach).

We had several meetings with the Administration of Water, Administration of Forest and Nature and landowners (see E1).

In our proposal we wanted to remove or restore 3 obstacles in each catchment area but there are now 4 obstacles in the catchment area of the Sûre. Three of these obstacles are at the tributary "Schwärzerbaach".

#### Schwärzerbaach

The tributary "Schwärzerbaach" (catchment area Sûre) is one of the cleanest streams in that area. There is very less income of sewage and no intensive farming next to the stream. Most of the meadows are used in a sustainable way. Therefore we decided to go on with the restoration of this stream.

All obstacles are meanwhile removed and no barriers for the movement of aquatic species remain. In spring 2017 the Administration des services techniques de l'agriculture (ASTA) will reconstruct the forestry road "Rammericherwee" and about 6 evacuation grids will be installed (see C1).

#### Huschterbaach

Project "Huschterbaach" (catchment area Our) should be already finished but some problems occurred. The forestry road is in a very bad condition and not accessible by trucks. Next to the place of the new bridge there is a forestry road which should be kept for forestry work. This fact, combined to the narrow space makes the planning difficult. The Administrations (AGE and ANF) decided how the work should continue after the land purchase or the agreement with the landowners was done. In 2016 we were able to buy land and finished the planning of the bridge. In March 2017 the forestry road will be reconstructed and then the tube will be removed and the bridge built. This approach was necessary because of the problems mentioned above.

Ruederbaach

In November 2016 the project “Ruederbaach” had to be planned quite fast because the local community together with ANF wanted to reconstruct the forestry road with the material of the new windmills in our area (see 5.1.7, water evacuation grids). In this case the bridge should be built before the road reconstruction and the river will be moved into a new river bed. All demands are sent to the Administrations. The work will be done in February 2017.

Table 3 : Obstacle transformation

| Catchment area            | Tributary      | Obstacle   | Planned   | Status              |
|---------------------------|----------------|--|-----------|---------------------|
| Sûre                      | Syrbaach       | Ford - restoration                                   | 100%      | Done, June 2015     |
| Sûre                      | Schwärzerbaach | Big tube – removal of the tube and building a bridge | 100%      | Done, October 2015  |
| Sûre                      | Schwärzerbaach | Tube – removal and building a bridge                 | 100%      | Done, October 2015  |
| Sûre                      | Schwärzerbaach | Tube removal, building a bridge                      | 100%      | Done, October 2016  |
|                           |                | Restoration of the forestry road                     | 100%      | Spring 2017         |
| Sûre                      | Froumicht      | <b>Tube removal and renaturation</b>                 | <b>5%</b> | <b>Outside LIFE</b> |
|                           |                | building bridge                                      | 5%        | Summer 2018         |
| Our                       | Huschterbaach  | Big tube – removal and building a bridge             | 80%       | Summer 2017         |
|                           |                | Restoration of the forestry road                     | 100%      | March 2017          |
| Our                       | Ruederbaach    | Tube removal, building bridge and new river bed      | 100%      | February 2017       |
|                           |                | Restoration of the forestry road                     | 100%      | March 2017          |
| <b>Our – outside LIFE</b> | Feierbech      | Tube removal, building bridge and new river bed      | 100%      | March 2017          |

➤ **Realised**

Removal of the third tube at the Schwärzerbaach/ Sûre (Annex 8).

➤ **Problems encountered/delays**

The action is on time and the success will be controlled within the project.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |  |  |  |  |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|--|--|--|--|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |  |  |  |  |
| C2 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |  |  |  |  |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |  |  |  |  |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

Removal of the fish obstacle in combination with the riverbed restoration (see 5.1.7, Realised)

The total amount of the restoration of the Feierbech riverbed, the transformation of the fish obstacle and the adaption of the access to the camping "Tintesmillen" were about 55.000 €. The transformation has been finished December 2016.

### 5.1.9 Action C3: Amélioration du substrat par dépôt de gravier

The intention of this action is to improve the quantity and quality of the river substratum in both rivers by the creation of clean gravel depots at five sites in each river.

#### ➤ Progress/results

Dump of 108,78 m<sup>3</sup> of gravel (16-32 mm) in the Our at the sites named Feischbur, Hiour, Kalbermillen and Groussenaël in October 2016 (see Figure 3).

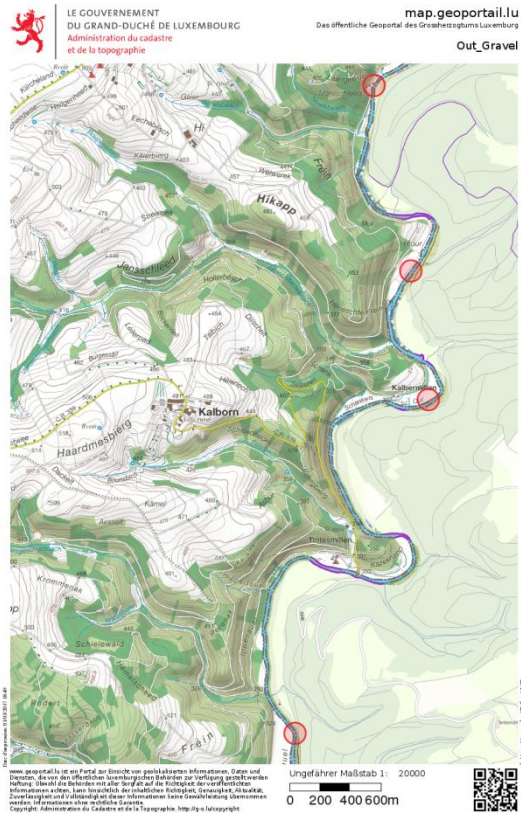


Figure 3: Gravel input in the river Our

Dump of 116,36 m<sup>3</sup> of gravel (16-32 mm) in the Sûre at the sites named Eilerhaff and Esperbech in October 2016 (see Figure 4.)

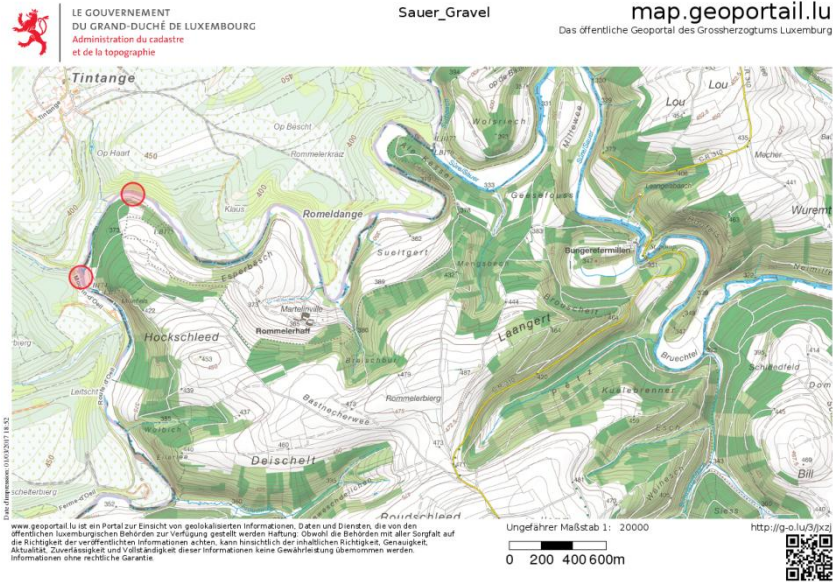


Figure 4: Gravel input in the river Sûre

It was not possible to drop a higher amount (200 m<sup>3</sup> precisely) in the river Sûre in order to readjust the amount of gravel as the water flow didn't move the gravel deposition from 2015. Therefore we dropped the gravel only on two sites in the Sûre. We plan to dump the gravel 2017 again on four sites in the river Sûre (see Table 4).

Table 4 : Amount of gravel and forecast

| amount gravel (m3) | 2012, 2013 | 2014   | 2015   | 2016   | 2017   | 2018         | sous-total     |
|--------------------|------------|--------|--------|--------|--------|--------------|----------------|
| Our                | 203,29     | 127,94 | 118,59 | 108,78 | closed | closed       | 558,60         |
| Sûre               | 0,00       | 95,98  | 76,10  | 116,33 | 200,00 | closed       | 488,42         |
|                    |            |        |        |        |        | <b>total</b> | <b>1047,02</b> |

➤ **Realised**

Dump of a total of nearly 100 m<sup>3</sup> gravel in each river each year.



➤ **Problems encountered/delays**

As we started with the gravel deposition a year later on the Sûre we will also finish a year later that means the last deposition on the Sûre will be done in 2017.

The delay at the beginning of the project for the river Sûre will be resolved by adding a year more for the deposition.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| C3 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    | Our |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

### 5.1.10 Action C4: Elevage de *Unio crassus* pour la Grande Région

The action deals with all the necessary steps to culture juvenile *Unio crassus* at the rearing facility at the mill of Kalborn.

#### ➤ Progress/results

In the report period, more than 1700 minnow were infested with *Unio crassus* larvae and more than 60.000 juvenile mussels could be collected (for details see

Table 5).

#### ➤ Realised

##### Rearing steps 2016

- 08.04.2016: Transfer of **81** adult *Unio crassus* from the river Our to the rearing facility. Between 12.04. – 02.05.2016: Transfer of **60** *Unio crassus* from the river Sûre to the rearing facility.
- Between 14.03 - 04.05.2016: Capture of **1363** host fish *Phoxinus phoxinus* in the river Our. Got **400** *Gasterosteus aculeatus* from the fish hatchery in Lintgen.
- Between 28.04.2016 - 30.05.2016: Infestation of **915** fish with river Our mussels. Infestation of **1114** fish with river Sûre mussels.
- Between 20.05.2016 - 12.07.2016: Collection of **15308** juvenile mussels from the river Our and **47798** from the river Sûre.

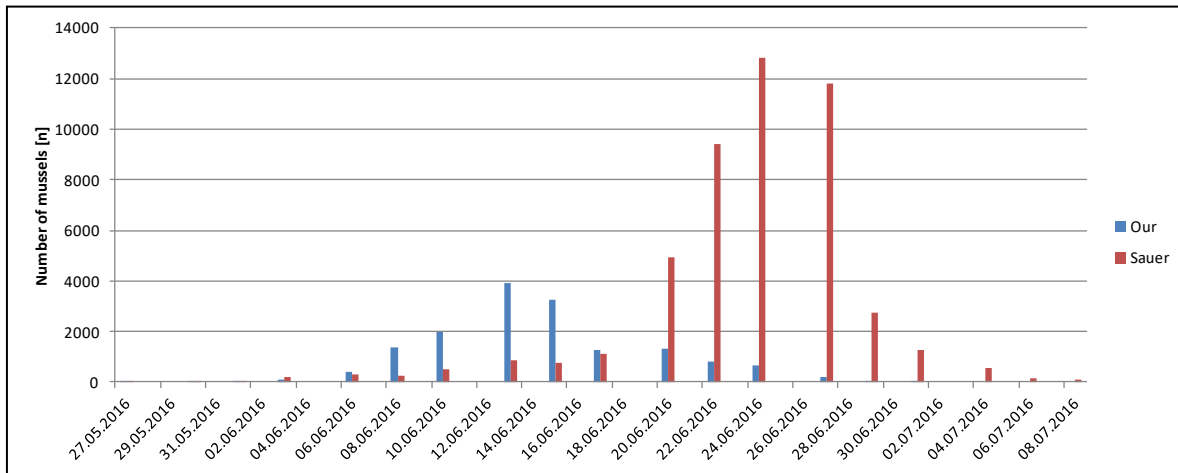


Figure 5 : Mussels collecting in 2016

As we harvested lots of juveniles in 2016 (see Figure 5) we transferred most of the freshly collected juveniles into 6 sand channels (2 for the river Our mussels / 4 for the river Sûre mussels) which we equipped with a automatic feeding system (Figure 6).

This is a new system which we tried for the first time at our facility. The intent is to add automatically food all over the day and try to reach a constant particle volume  $> 0.4 \mu\text{m}^3/\text{mL} \cdot 10^6$ . A particle volume between  $0.4 - 1.0 \mu\text{m}^3/\text{mL} \cdot 10^6$  is used by American colleagues to culture different freshwater mussel species.



Figure 6 : Sand channel with feeding bottle containing algae food

Two other new systems were tried in 2016. The use of a "Floating upwelling System (Flupsy)" (Figure 7) which we installed in the small fishpond in front of the rearing facility. In this first trial only 10 mussels from each river were transferred in these systems on 12.07.2016. After the first summer 18 from 20 mussels had survived.

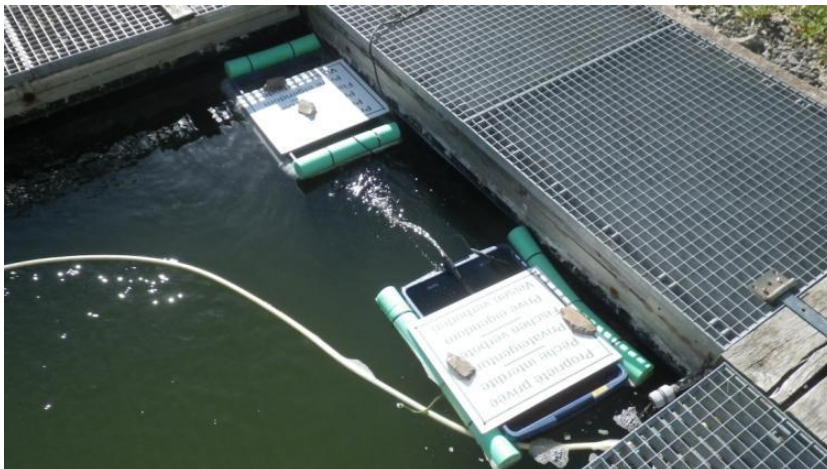


Figure 7 : Floating upwelling System (Flupsy) with *Unio crassus* from the river Our and Sûre

Furthermore we transferred from each river **104** juvenile mussels in "river water flow thru" channels July and August 2016 (see Figure 8). These channels will be checked again in spring 2017.



Figure 8 : Flow thru channel holding *Unio crassus*

The other mussels collected were transferred as the years before into detritus boxes or sand aquaria (see Table 5).

As foreseen, in June 2016 2 cages with infested minnows were installed in each river system.

- 10.06.2016 Release of 145 infested fish with a cage in the river Our
- 15.06.2016 Release of 100 infested fish with a cage in the river Sûre

Table 5 : Summary of rearing activities in season 2013 - 2015 and 2016

|                                       | Promised/realized 2013                | Promised/realized 2014 | Promised/realized 2015            | Promised/realized 2016 |
|---------------------------------------|---------------------------------------|------------------------|-----------------------------------|------------------------|
| <b>Fish infestation</b>               | 400/563<br>(+320 <i>S.trutta</i> )    | 400 /665               | 400/1895                          | 400/1784               |
| <b>Release in cages</b>               | 200/100 +170<br>released without cage | 200/0                  | 200/1315<br>released without cage | 200/245                |
| <b>Use in collecting installation</b> | 200/523                               | 200/665                | 200/450                           | 200/1784               |
| <b>Juvenile mussels collected</b>     | 5000/2693                             | 5000/4234              | 5000/23129                        | 5000/63106             |

Unfortunately the foreseen release of first cultured *Unio crassus* into the river Our and Sûre was not possible in 2016. Unusual high water levels during the period June July (height +/- 0.6 m, discharge >4.0 m<sup>3</sup>/s) (see Figure 9) restrained us from releasing the first mussels.

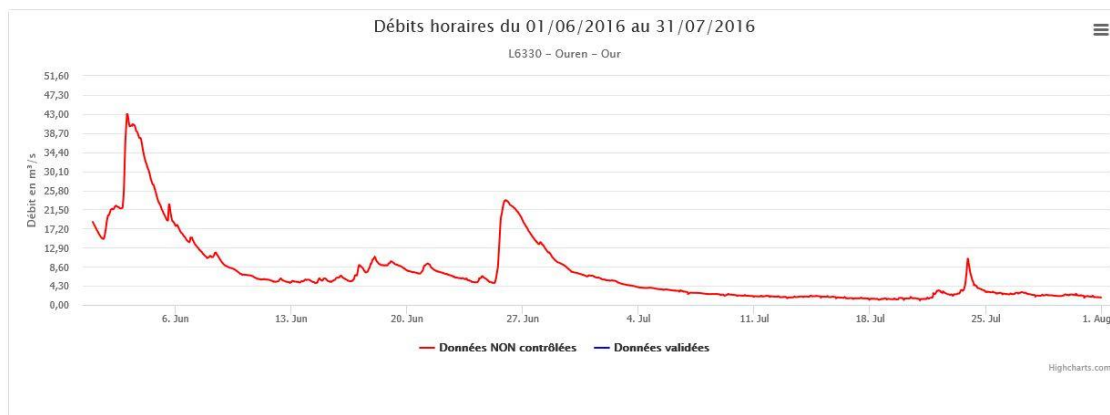
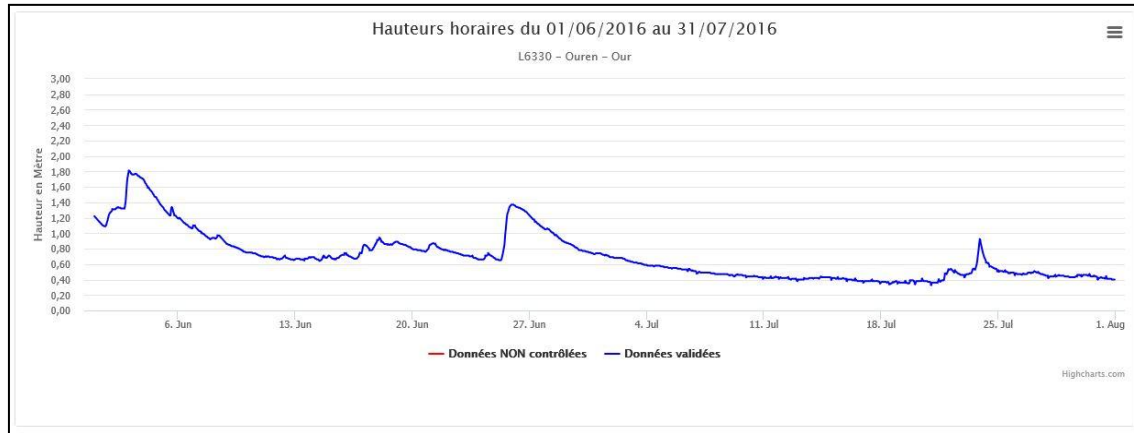


Figure 9 : High water level and discharge in the river Our in early summer 2016

Later in August when the discharge and height were again good to have access to the release places we decided to release some smaller mussels in the gravel boxes into the rearing channel, but not the older one directly into the river. On August 7th, 75 river Our mussels and 52 river Sûre mussels were released in the rearing channel at the mill of Kalborn.

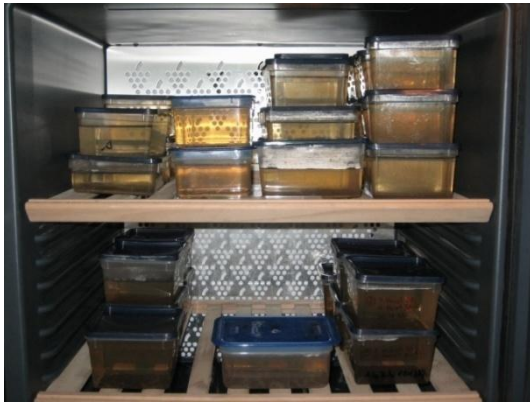
At the beginning of September all older gravel cages (installed in 2015 and before) in the rearing channel were opened and checked. So far 71 % of the mussels had survived and grown from 15 mm to 30 mm in average (Figure 10). Currently 20 gravel cages with 291 *U.c.* are present in the rearing channel.



Figure 10: Growth and survival of *Unio crassus* in the rearing channel at the mill of Kalborn

At the moment juvenile *Unio crassus* from both strain, Our and Sûre, are grown like the years before in 4 systems (see Figure 11):

- Detritus Boxes
- Sand Aquaria
- Sand Channels
- Gravel Boxes in the outside rearing channel



Detritus boxes



Sand Aquaria



Sand Channels



Gravel Boxes

Figure 11: Pictures of the different systems used for mussel rearing

At the moment (status January 2017) a total of 1350 river Our mussel and 1420 river Sûre mussel from different ages are present in the aquaria at the rearing facility. Many of these mussels need to be released into gravel cages in 2017. About 110 river Our and 110 river Sûre mussels are in the "Flupsy" and the "river water flow thru channel" and about 290 mussels (235 Our and 55 Sûre) in the rearing channel.

An unknown number of mussels is still present in some of the rearing channels. Our first results using this system indicate, that we added not enough food into the larger channels. Regular measurements using the cell counter (Figure 12) gave an average particle concentration of  $0.47 \mu\text{m}^3/\text{mL} \cdot 10^6$ . Although this is above the 0.4 level the colleagues from the USA indicate, we could not find live individuals during different samples of sand from the channels.

We have to consider that the, even if filtered, natural river water we use in these systems already has a background of particles which changes over time and averages out at about  $0.2 \mu\text{m}^3/\text{mL} \cdot 10^6$ . Therefore in our next trials we need to increase the food amount in these systems.

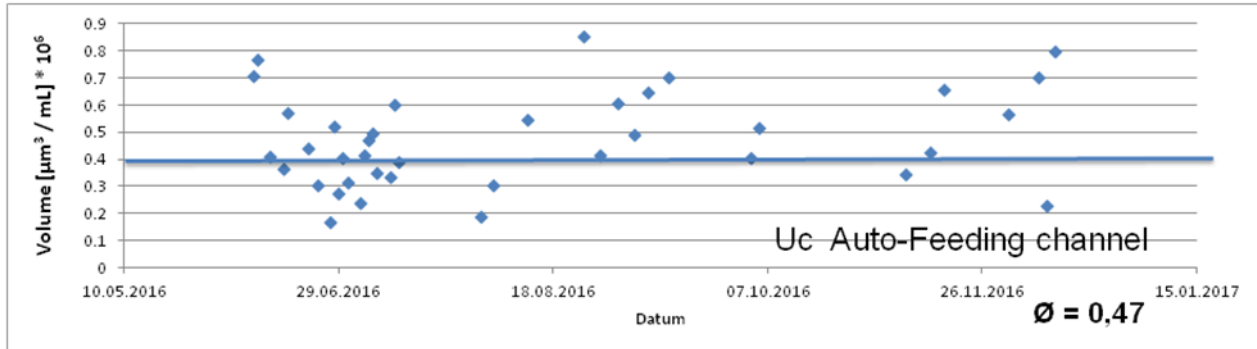


Figure 12: Particle concentration over time in an auto-feeding channel during the year 2016

It needs to be stated, that the production of these high numbers of mussels using sand channels was not foreseen in the LIFE-project and that we attain the number of mussels foreseen using the other methods, e.g. boxes, sand aquaria and gravel boxes.

➤ **Problems encountered/delays**

Problem: Installation of cages in the river Sûre and Our is difficult due to often high water levels (thunderstorms).

Solution: This problem cannot be foreseen. If impossible in the respective year, no infested fish will be released in cages but instead be released without a cage as in 2015. By releasing the fish with a cage, the area of the dropping of the mussel seed can be controlled. This is of course not possible by releasing the fish without cage. With the method "without cage", however much higher numbers of fish can be released (1.315 in 2015 instead of only 200 in 2016) and the impact will probably be even higher but will be hard to prove.



The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| C4 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

As the years before, we took care of three aquaria with *Unio crassus* mussels from Switzerland for colleagues from the ecological company eco-logis. Contact with many other mussel projects exist and are also listed under action F2.

### 5.1.11 Action C5: Régulation de la prédation du rat musqué

The muskrat are captured twice per year to reduce and/or to maintain the populations at a low level in the mussel rivers.

#### ➤ Progress/results

As in the previous years the capturing of the muskrats has been done by 2 persons from the ANF. High water levels didn't allow a permanent capturing in spring, whereby in summer at low level only few muskrats could be detected. The very few young animals in the summer can lead to the conclusion that many animals didn't survey the flooding or that the reproduction rate is lower under these difficult conditions.

In the following table (see Table 6) the number of muskrats are given which were caught in the respective rivers.

Table 6 : Caught muskrat at the river Sûre and Our

| Capturing period/ nb. of muskrats | 2012 | 2013 | 2014 | 2015 | 2016 | Total      |
|-----------------------------------|------|------|------|------|------|------------|
| River Our                         | 8    | 34   | 46   | 78   | 41   | <b>207</b> |
| River Sûre                        | 3    | 19   | 21   | 39   | 26   | <b>108</b> |
|                                   |      |      |      |      |      | <b>315</b> |

From July 2015, 2 persons from the ANF are trapping *Pascifastacus leniusculus* (Crayfish) and if the working time allows to do so, they are supported by the Life Unio team. As we can see from the data (see Table 7), in 2016, 4017 individuals on a river stretch of 2 km could be captured. Even if this number is high, we noticed that the density was much lower on the section which was already trapped in 2015.

On 21th of September 2016 a meeting with the ANF took place in order to work out a capturing strategy for the invasive species *Pascifastacus leniusculus*. This strategy is part of the national "Action plan for invasive species". We concluded that on the Our the capturing zone should coincide with the *Unio crassus* monitoring raster in order to collect data about the evolution of both species, the mussels and eventually the crayfishes.

Table 7 : Data of the captured crayfish

| Datum      | Methode | Anzahl | Dauer | Zeitaufwand | Personen | Zeitaufw.   | Strecke   | Total |
|------------|---------|--------|-------|-------------|----------|-------------|-----------|-------|
|            |         | Reusen |       | Stunden +/- | Stk.     | Stunden +/- | Meter +/- | Stk.  |
| 12.07.2016 | Reusen  | 2      | 12    | 0,5         | 2        | 1           |           | 24    |
| 13.07.2016 | Reusen  | 2      | 12    | 0,5         | 2        | 1           |           | 3     |
| 20.07.2016 | Reusen  | 4      | 12    | 0,5         | 2        | 1           |           | 38    |
| 21.07.2016 | Reusen  | 4      | 12    | 0,5         | 2        | 1           |           | 38    |
| 22.07.2016 | Reusen  | 4      | 12    | 0,5         | 2        | 1           |           | 20    |
| 25.07.2016 | Reusen  | 4      | 48    | 0,5         | 2        | 1           |           | 25    |

|            |        |   |    |     |   |     |      |     |
|------------|--------|---|----|-----|---|-----|------|-----|
| 28.07.2016 | Reusen | 4 | 12 | 0,5 | 2 | 1   |      | 13  |
| 29.07.2016 | Reusen | 4 | 12 | 0,5 | 2 | 1   |      | 28  |
| 02.08.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 11  |
| 03.08.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 30  |
| 04.08.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 30  |
| 05.08.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 28  |
| 18.08.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 51  |
| 19.08.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 32  |
| 19.08.2016 | Hand   |   |    | 4   | 4 | 16  |      | 217 |
| 22.08.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 13  |
| 23.08.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 53  |
| 31.08.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 20  |
| 01.09.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 47  |
| 02.09.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 42  |
| 05.09.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 39  |
| 06.09.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 40  |
| 06.09.2016 | Hand   |   |    | 1,5 | 2 | 3   |      | 100 |
| 08.09.2016 | Hand   |   |    | 2   | 2 | 4   |      | 154 |
| 14.09.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 15  |
| 21.09.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 31  |
| 21.09.2016 | Hand   |   |    | 1,5 | 2 | 3   |      | 47  |
| 22.09.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 30  |
| 26.09.2016 | Reusen | 4 |    | 0,5 | 2 | 1   |      | 11  |
| 27.09.2016 | Reusen | 2 |    | 0,5 | 2 | 1   |      | 45  |
| 27.09.2016 | Hand   |   |    | 2   | 2 | 4   |      | 262 |
| 28.09.2016 | Reusen | 3 |    | 0,5 | 2 | 1   |      | 66  |
| 28.09.2016 | Hand   |   |    | 1   | 2 | 2   |      | 111 |
| 28.09.2016 | Hand   |   |    | 2   | 2 | 4   |      | 153 |
| 30.09.2016 | Reusen | 3 |    | 0,5 | 2 | 1   |      | 62  |
| 30.09.2016 | Hand   |   |    | 2   | 2 | 4   |      | 125 |
| 03.10.2016 | Reusen | 3 |    | 0,5 | 1 | 0,5 |      | 27  |
| 04.10.2016 | Reusen | 3 |    | 0,5 | 2 | 1   |      | 29  |
| 05.10.2016 | Reusen | 3 |    | 0,5 | 2 | 1   |      | 22  |
| 05.10.2016 | Hand   |   |    | 2,5 | 2 | 5   |      | 200 |
| 06.10.2016 | Hand   |   |    | 3,5 | 2 | 7   |      | 211 |
| 06.10.2016 | Reusen | 3 |    | 0,5 | 2 | 1   |      | 5   |
| 07.10.2016 | Reusen | 3 |    | 0,5 | 2 | 1   |      | 64  |
| 10.10.2016 | Hand   |   |    | 2,5 | 2 | 5   | 1000 | 198 |
| 10.10.2016 | Hand   |   |    | 1,5 | 2 | 3   | 200  | 194 |
| 11.10.2016 | Reusen |   |    | 0,5 | 2 | 1   |      | 38  |
| 11.10.2016 | Hand   |   |    | 3   | 2 | 6   |      | 281 |

|            |          |        |        |                        |               |     |             |     |
|------------|----------|--------|--------|------------------------|---------------|-----|-------------|-----|
| 13.10.2016 | Reusen   |        |        | 0,5                    | 2             | 1   |             | 45  |
| 13.10.2016 | Hand     |        |        | 2                      | 2             | 4   |             | 185 |
| 14.10.2016 | Reusen   |        |        | 0,5                    | 2             | 1   |             | 36  |
| 17.10.2016 | Reusen   |        |        | 0,5                    | 2             | 1   |             | 57  |
| 17.10.2016 | Hand     |        |        | 2                      | 2             | 4   |             | 136 |
| 18.10.2016 | Reusen   |        |        | 0,5                    | 2             | 1   |             | 48  |
| 18.10.2016 | Hand     |        |        | 2                      | 2             | 4   |             | 81  |
| 19.10.2016 | Hand     |        |        | 0,75                   | 2             | 1,5 |             | 31  |
| 19.10.2016 | Hand     |        |        | 1                      | 2             | 2   |             | 52  |
| 21.10.2016 | Reusen   |        |        | 0,5                    | 2             | 1   |             | 13  |
| 15.12.2016 | Reusen   |        |        | 1                      | 1             | 1   |             | 10  |
| Total      | Aktionen |        |        | Zeitaufwand in Stunden |               |     |             |     |
|            | Hand     | Reusen |        | Hand                   | Reusen        |     | Total       |     |
|            |          | 132    |        | 81,5                   | 39,5          |     | <b>4017</b> |     |
|            | 2738     | 1279   |        | 121                    |               |     |             |     |
| %          | 68       | 32     | %      | 67                     | 33            | %   |             |     |
|            |          |        | Hand:  | 34                     | Krebse/Stunde |     |             |     |
|            |          |        | Reuse: | 32                     | Krebse/Stunde |     |             |     |

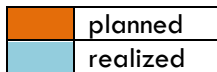
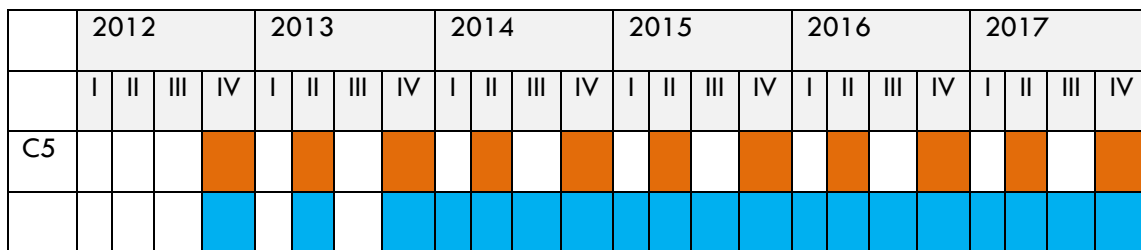
➤ **Realised**

315 trapped muskrats and 4017 trapped crayfishes

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule.



➤ **Complementary action outside LIFE**

None.

### 5.1.12 Action D1: Surveillance de la qualité de l'eau et du substrat interstitiel

The water quality is a key issue for the protection of the thick shelled river mussel and is monitored within this action.

#### ➤ Progress/results

Once a week a sample from each river is taken and analyzed. The parameters temperature, pH value, conductivity, turbidity, oxygen concentration, ortho-phosphate, nitrite, ammonium, chloride and nitrate were determined.

#### Water quality and turbidity

The online monitoring system on the river Our worked with minor problems.

The mobile online monitoring system in the Sûre catchment is working since August 2014 at the river Syrbaach. During the wintertime the maintenance of the probe is difficult because of often high water levels with high velocity. Therefore required calibrations are missing and some of the data cannot be used. In future we try to handle the probe from the bank and calibrate it more often (see also D4, Annex 13).

The water quality of the tributaries and their springs has been sampled three times in the last period.

631 samples of the rivers, streams and springs were measured in the period between February 2016 to January 2017 - 126 samples of river Our and Sûre, 112 samples of tributary mouths, 293 samples of springs and 98 samples of points of interests (new springs, water of unknown tubes...). Overall about 300 samples were analysed from points where restoration measures took place, new or interesting points. Table 8 gives an overview of some water parameters from the river Our and Sûre, given as annual mean.

There were problems with hydro peaking at the river Our (see Annex 10).

Table 8 : Annual mean of several water parameters from the river Our and Sûre 2016

| Parameter                          | Our (Kalbermillen)<br>Annual mean |                     |         | Sûre/ Moulin de Bigonville<br>Annual mean |                     |         |
|------------------------------------|-----------------------------------|---------------------|---------|---|---------------------|---------|
|                                    | value                             | water quality class |         | value                                     | water quality class |         |
|                                    |                                   | Luxembourg          | Germany |   | Luxembourg          | Germany |
| <b>Discharge [m<sup>3</sup>/s]</b> | 5,6 (Ouren)                       | ---                 | ---     | 4,2<br>(Bigonville)                       | ---                 | ---     |
| <b>Water temperature [°C]</b>      | 8,6                               | ---                 | ---     | 9,0                                       | ---                 | ---     |
| <b>Conductivity [µS/cm]</b>        | 142                               | ---                 | ---     | 153                                       | ---                 | ---     |
| <b>Turbidity [FNU]</b>             | 4,6                               | ---                 | ---     | 7,5                                       | ---                 | ---     |
| <b>Nitrate [mg/L]</b>              | 15,3                              | good                | II -III | 15,6                                      | good                | II -III |
| <b>nitrite [mg/L]</b>              | 0,04                              | very good           | I       | 0,04                                      | very good           | I       |
| <b>ammonium [mg/L]</b>             | 0,06                              | very good           | I       | 0,08                                      | very good           | I       |
| <b>chloride [mg/L]</b>             | 16,2                              | ---                 | I       | 18,0                                      | ---                 | I       |

Sources:

Luxembourg:

[https://eau.public.lu/actualites/2009/12/plan\\_de\\_gestion/Methodenhandbuch.pdf](https://eau.public.lu/actualites/2009/12/plan_de_gestion/Methodenhandbuch.pdf)

Germany

[https://www.umweltbundesamt.de/sites/default/files/medien/1968/dokumente/chemische\\_guteklassifikation.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/1968/dokumente/chemische_guteklassifikation.pdf)

The physic-chemical data of the rivers are similar to the last years. It has to be mentioned that the nitrate concentration increased between 2015 to 2016 from 13,0 (Our) respectively 13,4 (Sûre) mg/L to 15,3 resp. 15,6 mg/L.

The “Comité de Pilotage” was informed in December 2016 again about the water quality of the sampled rivers and tributaries and about places where major pollution was observed (see action F1). The goal is to solve them in near future.

In July 2016 we collected eleven samples of the springs and concentration of several metals and pesticides were determined by the laboratory of the Water Administration (see Annex 9). Degradation products of Metazachlor were found in all of our samples in concentrations ranging from 99 to 2258 ng/L (see also E1).

In the last year we planned measures (see A2) to reduce the income of fine sediment. The efficiency of these measures should be documented and therefore sediment boxes were placed at the area of 3 restoration points (see D4).

A turbidity logger was bought in June 2015 and placed in the Schwärzerbaach. The next maintenance will be done in spring 2017 and it will be carried out by at the firm's expense.

The online measurement station at the Moulin de Bigonville from the Water Administration was installed in December 2015. Data is already available but the data has to be confirmed from the Water Administration lab.

Quality of interstitial

To have an overview over the quality of the interstitial, redox measurements were done (see more details under action D4). Additionally the quality of the interstitial next to the mussels bank has been monitored. Therefore we took water samples from the bed, examined the composition of the river bed and did redox measurement.

Annex 9 shows graphs of the measurements of the rivers, their tributaries and other data dealing with the water quality.

➤ **Realised**

Monitoring of the rivers and its tributaries

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| D1 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

### 5.1.13 Action D2: Monitoring des poissons hôte

This action should give an overview about the host fish population in both rivers (Our and Sûre) and their tributaries.

#### ➤ Progress/results

A new permission from the MDDI to perform electric fishing in the river Our and Sûre and the respective tributaries was issued on 17.02.2016 and is valid until 2018 (see Annex 11).

In 2016 electric fishing activities were again foreseen in some of the tributary streams, of the river Our an Sûre. The intent was to check the fish population in some of the tributaries, but more important, to check if the transformed obstacles are meanwhile passable for upstream swimming fish.

Table 9 gives an overview of the electric fishing activities on the tributaries in 2016.

Table 9 : Electric fishing activities at the tributaries in 2016

| Date                 | Tributary                   | Intent (fish population <b>FP</b> or migration obstacle <b>MO</b> ) | Number of species | Individuals                 | Remark  |
|----------------------|-----------------------------|---|-------------------|-----------------------------|---|
| <b>Our catchment</b> |                             |   |                   |                             |   |
| 23.11.2016           | Traesbech                   | FP  | 2                 | 12                          | /   |
| 23.11.2016           | Huschterbaach-mouth         | FP  | 3                 | 37                          | /   |
| 23.11.2016           | Huschterbaach-obstacle      | MO  | 1                 | 19<br>(downstream obstacle) | Obstacle not yet remodelled<br><br>No fish individuals after the obstacle                                 |
| 23.11.2016           | Gemünder-Akescht - mouth    | FP  | 1                 | 7                           | /   |
| 23.11.2016           | Gemünder-Akescht - obstacle | MO  | 0                 | 0                           | No fish individuals before and after the obstacle   |
| 23.11.2016           | Ruederbaach                 | MO  | 1                 | 1                           | Obstacle not yet remodelled Fish individual before obstacle<br><br>No fish individuals after the obstacle |



| <b>Sûre catchment</b> |                             |   |    |   |    |   |
|-----------------------|-----------------------------|---|----|---|----|---|
| 30.11.2016            | Syrbaach mouth              | - | FP | 5 | 77 | /   |
| 30.11.2016            | Froumicht obstacle          | - | MO | 2 | 6  | Obstacle not yet remodelled<br><br>No fish individuals before obstacle<br><br>No fish individuals after the obstacle  |
| 30.11.2016            | Schwärzerbaach - obstacle 1 |   | MO | 1 | 6  | Obstacle already removed<br><br>2 fish individuals before and 4 fish individuals after transformed migration obstacle |
| 30.11.2016            | Schwärzerbaach - obstacle 2 |   | MO | 1 | 4  | Obstacle already removed<br><br>1 fish individual before and 3 fish individuals after transformed migration obstacle  |
| 30.11.2016            | Schwärzerbaach - obstacle 3 |   | MO | 1 | 4  | Obstacle already removed<br><br>0 fish individuals before and 4 fish individuals after transformed migration obstacle |

Due to low water levels during late summer and autumn the number of individuals was low in all tributaries. The expected composition of species was present in the lower parts of the streams as well as with trout and bullhead in the more upper parts. At the Schwärzerbaach three migration obstacles have meanwhile been transformed and in November we were able to see that the transformation was a success. Small trout were again present in all parts of the river. Table 9 gives an overview.

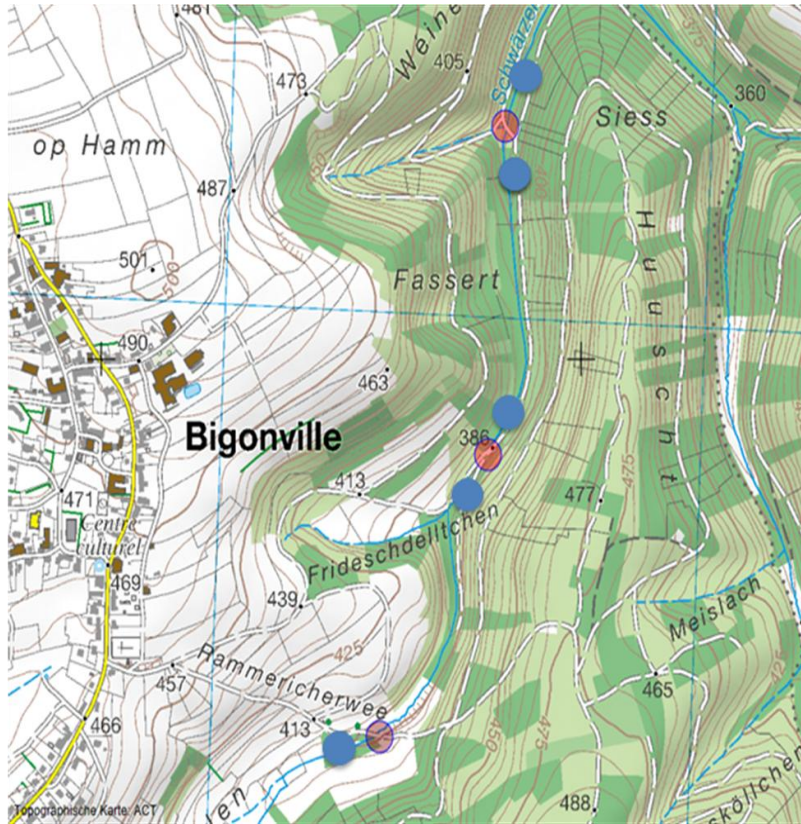


Figure 13: Schwärzerbaach with location of the transformed migration obstacle (red dots). Blue dots indicate the presence of brown trout during the electric fishing in November 2016

### ➤ Realised

As foreseen under this action:

In 2016: Electric fishing at tributaries of the river Our and river Sûre.

In 2016: Electric fishing at the river Our in April 2016 to obtain host fish (*Phoxinus phoxinus*) for the infestations with glochidia from *Unio crassus*.

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| D2 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

**5.1.14 Action D3: Suivi de *Unio crassus* dans son milieu naturel**

The status of the *Unio crassus* populations in both rivers (Our and Sûre) was last investigated in 2003. To gain new information about the population size, age structure and habitat use, the intent of this action is to monitor the mussel population in both rivers.

➤ **Progress/results**

Estimation of *Unio crassus* population size and density:

On the river Our 87 % of the survey have been done (26,2 km for a total length of 30 km).

Size: 4.315 mussels and 1.609 shells have been counted.

Mean density: 0,03 ind/m<sup>2</sup> .

The monitored section nearly matches the one prospected in earlier periods. In the year 2003 393 mussels were counted (9.030 estimated) and in the year 1990 883 were counted (5.654 estimated).

On the river Sûre 69 % of the survey have been done (14,5 km for a total length of 18 km).

Size: 2.326 mussels and 2.946 shells have been counted.

Mean density: 0,03 ind/m<sup>2</sup>

The monitored section nearly matches the one prospected in earlier periods. In the year 2003 10.442 mussels were counted (31.139 estimated).

While the visual method by bathyscope allows a high rate of exploration, a quick cover of a large area and delivers qualitative data, it cannot give certain quantitative results as fully buried individuals are not visible. The difference between the abundance visually observed and that obtained from sediment excavation can vary from 1 to 10 (Lamand F., Beissel J.-N 2014: Comparison of visual observation and excavation to quantify density of endangered freshwater mussel *Unio crassus* in rivers in north-eastern France. Knowledge and Management of Aquatic Ecosystems (2014) 413, 11).

Estimation of *Unio crassus* survival rate:

Mussels have been marked on 3 banks:

Table 10 : Overview - Kalbermillen

| <b>Kalbermillen, near to mill channel</b> |                        |                        |                    |
|---|------------------------|------------------------|--------------------|
| <b>marked</b>                             | <b>found</b>           | <b>alive</b>           | <b>empty</b>       |
| 101                                       | 12                     | 12                     | 0                  |
|   | <b>recovery rate %</b> | <b>survival rate %</b> | <b>loss rate %</b> |
|   | 11,88                  | 100,00                 | 0,00               |

Table 11 : Overview - underneath the camping Kohnenhaff (Untereisenbach)

| <b>underneath the camping Kohnenhaff (Untereisenbach)</b> |                        |                        |                    |
|---|------------------------|------------------------|--------------------|
| <b>marked</b>   | <b>found</b>           | <b>alive</b>           | <b>empty</b>       |
| 64  | 30                     | 26                     | 4                  |
|   | <b>recovery rate %</b> | <b>survival rate %</b> | <b>loss rate %</b> |
|   | 46,88                  | 86,67                  | 13,33              |

Table 12 : Overview - Sûre: underneath Moulin de Bigonville

| <b>Sûre: underneath moulin de Bigonville</b> |                        |                        |                    |
|--|------------------------|------------------------|--------------------|
| <b>marked</b>                                | <b>found</b>           | <b>alive</b>           | <b>empty</b>       |
| 104  | 14                     | 12                     | 2                  |
|  | <b>recovery rate %</b> | <b>survival rate %</b> | <b>loss rate %</b> |
|  | 13,46                  | 85,71                  | 14,29              |

Beside Kohnenhaff with a recovery rate of 46,88%, the values at the other sites varied between 12 and 13%. We noticed this year that due to a relative high water level till end of June, the mussels stayed buried in the sediment probably for a longer time. It was very difficult to recover them. The loss rate varied between 13 and 14%.

Sediment analysis:

Probes (+/-2000g) were collected with buckets (3 litres) on the mussel banks. The grain mixture is quite similar at the 3 locations (Kalbermillen (Our), Kohnenhaff (Our), Moulin de Bigonville (Sûre)). About 90% is formed by the fraction >2mm, whereas between 10 and 2% is >630 µm, about 1% > 630 µm and less than 1% < 63 µm (see the details under Annex 12)

Fertility control:

08.04.2016 Transfer of 81 animals for breeding from the river Our (section HiOur) to the rearing station.

12.04 - 02 05.2016 Transfer of 60 animals for breeding from river Sûre (different sections) to the rearing station.

After the release of their glochidia the mussels were placed back to the same sites in the rivers (10.08.2016 on the Sûre and Our).

Mussel release

No mussels were directly released in any river in 2016, due to high water levels in early summer (see action C4). However more mussels were released in cages in the rearing channel.

We again intend to release the first mussels into the river Our and Sûre this year. The chosen places remain the same.

River Our - Release of 10 individuals per site on the banks near to the Kalbermill and below the site Kohnehaff in May-June 2017. Their fitness will be checked in September 2017.

River Sûre - Release of 10 individuals on the banks below the mill of Bigonville in May-June 2017. Their fitness will be checked in September 2017.

➤ **Realised**

Table 13 : Mussel monitoring in the river Our and Sûre

|                        | Our (30 km) | Sûre (18 km) |
|------------------------|-------------|--------------|
| <b>Prospected (km)</b> | 26,2        | 14,5         |
| <b>mussels alive</b>   | 4.315       | 2.326        |
| <b>empty shells</b>    | 1.609       | 2.946        |

Monitoring site Our

Monitoring site Sûre

➤ **Problems encountered/delays**

No other problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| D3 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

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|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

#### 5.1.15 Action D4: Monitoring et évaluation de l'impact des mesures concrètes

The aim of this action is to develop and apply a pre- post-monitoring protocol in order to evaluate the effectiveness of the used restoration methods.

##### ➤ Progress/results

The initial status quo of water quality and population of *Unio crassus* will be used as reference for the evaluation of prospective measures.

The success of the restoration measures is evaluated by the monitoring of concrete parameters (water quality, turbidity, quality of substrate and the host fish population).

On selected places, where we will do or have done measures, (as seen in Table 14 below) an intensive monitoring is done. This means that on these sites a water sample is taken once per week, sediment traps are installed, interstitial quality will be measured and the host fish population is monitored.

The monitoring of the water quality of the rivers Our, Sûre and their tributaries is in operation. (see action D1).

The evaluation of the water quality at the places where we have done measures isn't easy. The water quality is strongly influenced by the rain. The gradient of the nitrate concentration of Folkesbur is interesting. The concentration clearly decreases after passing a wet meadow. Therefore we can show that an intensive contact of water with plants can improve the water quality. It is important to keep such wet meadows.

The river beds downstream of the gravel input were monitored. Therefore we measured the redox potential in the free flowing water, in the interstitial at 5cm depth and if possible in the interstitial at 10cm depth. The average ratio between 5 cm depth and the free water was in the river Our about 53% and in the river Sûre about 39%. That means it comes to a loss of oxygen of about 47% in 5cm depth in the river Our which is quite the same like last year. In the case of river Sûre we had a loss of more than 60% compared to last year of 47%. At least in pearl mussel river, where the use the redox potential, is well established the loss in 5 cm depth should not exceed 25%. However recent studies in *Unio crassus* rivers (Denic et al. 2013, Physiochemical assessment of *Unio crassus* habitat quality in a small upland stream and implications for conservation HYDROBIOLOGIA 735(1) revealed no significant difference in the loss of the redox potential at 5 and 10 cm depth between colonized and non colonized stretches. More detailed results about the redox measurements can be seen in Annex 13.

The composition of the host fish population was already monitored at all relevant sites (see D2).

The monitoring of the *Unio crassus* population in its natural environment started in spring 2013 (see D3).

The mussel breeding started in spring 2013 (see C4).

In 2014 first *Unio crassus* were released in gravel cages in the rearing channel at the mill of Kalborn (see also action C4). All cages were checked in September 2016 and good growth and survival was observed (see Figure 7).

## ➤ Realised

A good overview about water quality (D1), host fish population (D2) and *Unio crassus* population (D3) is achieved. For water quality see for instance Annex 9.

The summary of preliminary evaluations can be found in Annex 13.

Table 14 : Monitoring restoration sites

| River/ Tributary      | Measures  | Water quality | Sediment traps              | Interstitial quality | Host fish population |
|-----------------------|---|---------------|-----------------------------|----------------------|----------------------|
| Sûre - Schwärzerbaach | - Remove tube and build a bridge (3 done, see C2)             | yes           | yes                         | yes                  | yes                  |
| Sûre - Syrbaach       | Restore of a ford (done, see C2)                              | yes           | yes                         | Planned 2017         | yes                  |
| Our - Roupelsbaach    | - Fencing spring and stream (done, see C1)                    | yes           | yes                         | Planned 2017         | no                   |
| Our - Folkesbur       | Fencing spring and stream (done, see C1)                      | yes           | yes                         | Planned 2017         | no                   |
| Our - Roderbaach      | Building a bridge and creating a new riverbed (February 2017) | yes           | no – income of waste water  | Planned 2017         | yes                  |
| Our - Huschterbaach   | - Remove tube and build a bridge (summer 2017)                | yes           | yes                         | Planned 2017         | yes                  |
| Our - Feierbech       | Pilot project Feierbech (see C1)                              | yes           | no                          | no                   | no                   |
| Our                   | Gravel (done)   | yes           | no – to wide, high velocity | yes                  | yes                  |
| Sûre                  | Gravel (done)   | yes           | no - to wide, high velocity | yes                  | yes                  |



➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| D4 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

### 5.1.16 Action D5: Analyse de l'impact socio-économique du projet et de l'effet sur les écosystèmes

The objective is to assess the impact of the Life Nature project on the welfare of the region and its populations.

#### ➤ Progress/results

We plan to sub-contract the socio-economic analysis.

Together with the LIFE Eisleck team we got into contact with the Life Cycle Sustainability Assessment (LCSA) team of LIST (Luxemburgish Institute of Technology). This team is well experienced in conducting socio economic studies as well as in the analysis of the impact of ecosystem services. They proposed us to do two separated studies for the two LIFE projects managed by natur & ëmwelt in the north of Luxembourg with the help of a student. The methodological approach of the LIST team can be found in Annex 14 and convinced us to choose this team. As they use a student to do the analysis the cost are marginal (2.500€, study and written report excluding charges) and no other company would be able to provide such a study for this amount.

Referring to our procedure when requiring market, presented in the progress report I, and taking into account our selection criteria for external assistance < 15.000 € we choose this provider (experience in the field, low costs, precise working plan and timetable). Therefore no call for tender was done and we did a direct negotiation with the subcontractor. The LIFE Unio team is still responsible for delivering all the necessary data, maps and information to conduct the study. Therefore during 2016 we had several meetings with the LCSA team and provided already all the information's necessary to start the analysis.

- February 2015 first contact with a scientist of L.I.S.T (Luxemburgish Institute of Technology) to get a meeting.
- 20.04.2016: First meeting with the Life Cycle Sustainability Assessment (LCSA) team of LIST
- 12.09.2016: Signing of the research service offer for a fixes price service with the LIST (see Annex 14).
- 20.12.016: Second meeting with the Life Cycle Sustainability Assessment (LCSA) team of LIST and presentation of the student (Alya Bolowich) who will work on the socio economic study.
- 02.02.2017: Field visit with the LCSA-team to present and explain the concrete restoration measures done during the LIFE project

#### ➤ Realised

Several meetings with the sub-contractor and delivering of data.

➤ **Problems encountered/delays**

No problems encountered so far. The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| D5 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

### 5.1.17 Action E1: Information et sensibilisation des acteurs concernés

The reduction of the input of fine sediments in the aquatic ecosystem is of great importance in the present Life project. This action intends to inform all actors responsible for water quality in the river catchment and tries to motivate them to help to enhance the water quality.

#### ➤ Progress/results

We try to keep a good contact and to have regular exchange with the different authorities and with the farmers of the project area.

In the report period 01.03.2016 to 28.02.2017 39 meetings with stakeholders took place (see Annex 15).

For instance in the year 2016 members of the LIFE Unio team were involved in the public consultation about the national action plan to reduce pesticides (Avis dans le cadre de la Consultation publique du Ministère de l'Agriculture, de la Viticulture et de la Protection des consommateurs relative au Plan d'action Produits phytopharmaceutiques - Programme luxembourgeois de réduction des « pesticides » (PRP)) (Figure 14)

As the project got extended for 1 year, we plan to organize the two upcoming forums on water quality at the end of 2017.

Two more information events with farmers are still planned. The subject of the next information event was recently discussed during the 5th comité de pilotage. The delegate from the administration of agriculture recommended choosing a subject which is useful for the farmers rather than completing our foreseen list (e.g. fencing techniques). Our plan is to inform the farmers on the next event about the management plans of the nature 2000 areas Our and Sûre and how the agriculture can help to meet the goals of these management plans.

The information leaflet for the farmers will be produced after the last information event for the farmers as the content of the leaflet is fully related to these information events for farmers. The plan is to organize the last information events at the end of 2017 and then produce the leaflet in 2018. In this way it can be distributed among the farmers before the end of the project.

In order to express their discontentment about the rather uncontrolled use of phytopharmaceutical substances in Luxembourg and the lack of transparency of their use in agriculture natur&ëmwelt and Greenpeace threatened to claim juridical the information of the Ministry of Agriculture (see Figure 14).

On 21<sup>th</sup> of November 2016 the Ministry of Agriculture published the data of the substances used between 2011 and 2014. This data showed that nearly 50% of the used substances figures on the EU Pesticide Blacklist. With a part of 10%, glyphosate is the most used pesticide, that's why together with the NGO's Mouvement Ecologique and Greenpeace natur&ëmwelt launched a public request to the CE to forbid glyphosate.

Greenpeace Deutschland 2016:

[http://www.ounipestiziden.lu/uploads/2/2/4/8/22480338/schwarze\\_liste\\_pestizide\\_greenpeace\\_juli\\_2016.pdf](http://www.ounipestiziden.lu/uploads/2/2/4/8/22480338/schwarze_liste_pestizide_greenpeace_juli_2016.pdf)



Figure 14: Press event in cooperation with Greenpeace Luxembourg on the national pesticide action plan

➤ **Realised**

We had about 39 meetings and contacts with authorities and other actors in 2016 (see Annex 15).

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule. Contact with different stakeholders is constantly and is not only restricted to the periods highlighted in brown in the table below.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| E1 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

### 5.1.18 Action E2: Sensibilisation du grand-public

This action tries to inform people about the sense of the Natura 2000 network and the overall intent of the project by the following means:

Information of the population: 1 session/river at the beginning and end of the project.

Press release: 100-150 articles

Project Flyer: 1

Notice board: 2

Film: 1

Exhibition: 1

Natura 2000 visiting room: 1

#### ➤ Progress/results

##### 1. Information of the population

Groups of people visiting the mill are informed all over the year and in 2016 1052 people of all ages visited the rearing facility at the mill of Kalborn (see Annex 16 and picture 11-15).

Furthermore we participated again at five larger information events in 2016 during which 670 people could be educated and informed.

- o 31.01.2016: Ramsar day in Boulaide (Naturpark UewerSauer). Excursion and information stand (50 people)
- o 20.03.2016: interactive information event at the Wasserfest from the Naturpark UewerSauer (200 people)
- o 13.04.2016: interactive information event at the Racksmille. Interactive workshop for all children from two primary schools (120 children)
- o 02.07.2016: Celebrating 20 years nature activities at the "Haus vun der Natur" in Kockelscheier. Interactive workshop for children (50 children)
- o 07.08.2016: interactive information event at the Naturparkfest from the Naturpark Our (250 people, see picture.....)

##### 2. Press release

- o 15 articles in 2016 (Annex 17).
- o Appearance on RTL Radio 02.06.2016 (<http://radio.rtl.lu/emissionen/kiosk/1345697.html>)

##### 3. Project Flyer

The Flyer is finished and available in 3 languages (German, French and English). Nothing new was done here in 2016.

4. Notice board

The content of the notice board is finished. The graphical layout, printing and installation still needs to be done (see Annex 18)

5. Film

Several meetings with the professional communication company (marc wilmes design s.à.r.l.) and the film student Julian Kolb took place in 2016 (e.g. 04.07.2016 /03.08.2016). During autumn and winter 2016 more film footage was collected and a story board was developed. Furthermore first animation sequences were developed.

6. Exhibition

The exhibition is meanwhile installed permanently at the mill. As more and more people visit the mill this is the best location to attend most interest.

7. Natura 2000 visting room

The installation of the natura 2000 room is finished. Since autumn 2016 the room is open for visitors. The official inauguration is planned for June 5th 2017. See Annex19 for pictures.

As already mentioned in the progress report II, we got additional sponsoring from the HSBC Bank to purchase didactical material and developed a program to educate children about the importance of water. We equipped the room below the roof with optical and didactical material and integrated also the LIFE part which was foreseen to do these activities. An information leaflet (Outside LIFE) about the "Water Experience Centre" was elaborated and send to all schools in Luxembourg. In 2016 already 24 groups representing 612 children were able to visit the water experience centre. As the LIFE project helped to purchase parts of the didactical and optical equipment, we proceeded to label all the material with the LIFE logo, as required during the last project visit.

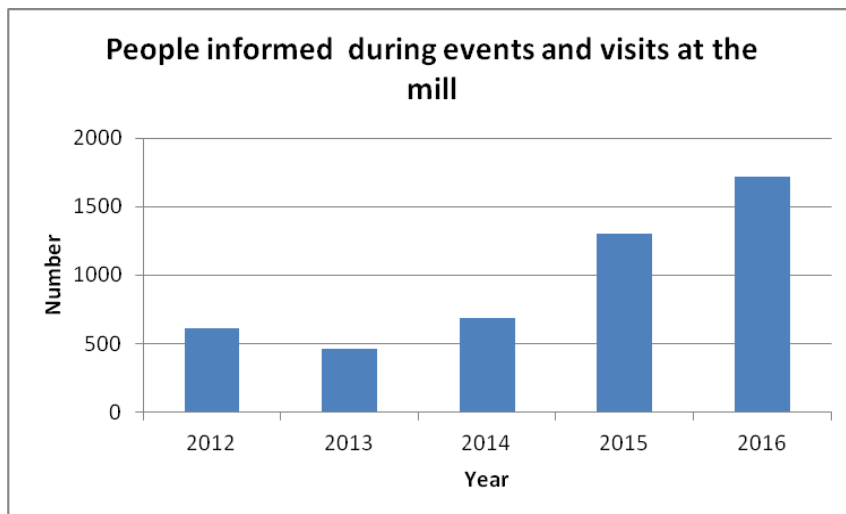


Figure 15: Development of the number of people informed during the LIFE project

➤ **Realised**

Flyer, 5 exhibition boards, different press articles in printed and online media, Natura 2000 room.

About 4517 people were informed during different visits and other events throughout the project runtime of the LIFE Unio project.

In 2016 a new record with 1722 people was obtained. (see Annex16).

Table 15 : Number of people informed about the LIFE project in the last years

|                                     | 2012       | 2013       | 2014       | 2015        | 2016        | Total       |
|-------------------------------------|------------|------------|------------|-------------|-------------|-------------|
| Visitors at the mill                | 46         | 261        | 589        | 624         | 1052        |             |
| People informed during other events | 300        | 200        | 100        | 675         | 670         |             |
| <b>Total</b>                        | <b>346</b> | <b>461</b> | <b>689</b> | <b>1299</b> | <b>1722</b> | <b>4517</b> |



Figure 16: Children exploring wildlife in the water experience centre



Figure 17 School class from the Lycée du Nord Wiltz





Figure 18: Children searing for life in the river Our mill channel



Figure 19: Information desk at the "Naturparkfest 2016"

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| E2 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

Sponsoring by the HSBC project (see also progress report II).

### 5.1.19 Action E3: Création d'un site Web

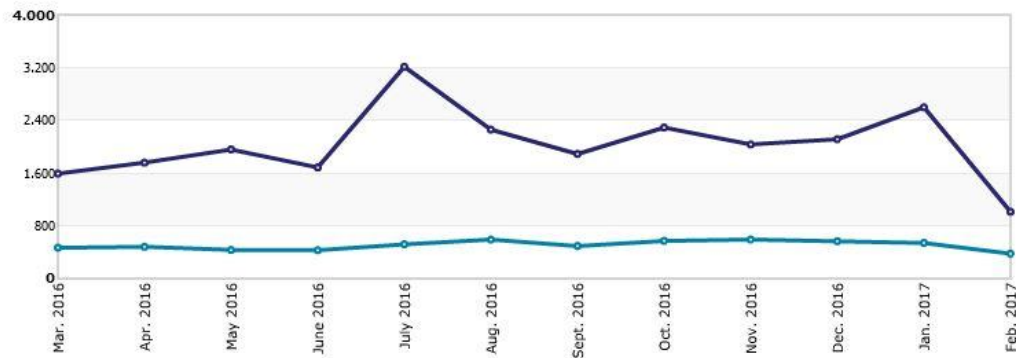
Creation of a website. The project homepage will give the opportunity to inform all interested persons about the progress of project. Furthermore technical documents, provided as download, should help other projects working in a similar field.

#### ➤ Progress/results

Since June 2013 the website is fully accessible in all three languages (English, French and German).

In 2016 we added 12 times content in the news section as planned. Compared to last year the number of visitors per month has slightly increased from 434 visitors/month to 501 visitors/month. Nearly 90% of the visitors access our side by directly using the URL: [www.unio.lu](http://www.unio.lu). This demonstrates that the name was well chosen (web statistics see Figure 20).

Overview



General overview of the website frequentation total and average values

| INFORMATION                                    | TOTALS         | Ø AVERAGE            |
|--|----------------|----------------------|
| <span style="color: red;">■</span> Hits        | 35.018 Hits    | 2.918 Hits / Month   |
| <span style="color: darkblue;">■</span> Visits | 24.377 Visits  | 2.031 Visits / Month |
| <span style="color: teal;">■</span> Visitors   | 6.021 Visitors | 501 Visitors / Month |

Details of website frequentation grouped by date

| DATE           | VISITS | VISITORS | HITS  | TRENDS |
|----------------|--------|----------|-------|--------|
| February 2017  | 1.010  | 374      | 1.869 |        |
| January 2017   | 2.595  | 538      | 3.489 |        |
| December 2016  | 2.111  | 563      | 3.396 |        |
| November 2016  | 2.032  | 588      | 2.842 |        |
| October 2016   | 2.289  | 568      | 3.308 |        |
| September 2016 | 1.888  | 491      | 2.348 |        |
| August 2016    | 2.257  | 586      | 3.427 |        |
| July 2016      | 3.211  | 516      | 4.273 |        |
| June 2016      | 1.683  | 425      | 2.259 |        |
| May 2016       | 1.957  | 429      | 3.015 |        |
| April 2016     | 1.755  | 478      | 2.791 |        |
| March 2016     | 1.589  | 465      | 2.001 |        |

## Access Type

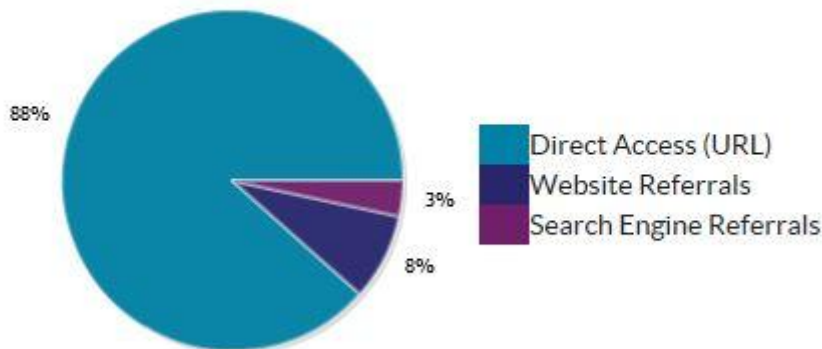


Figure 20: Web statistics

The most used language on the website is German at the moment, followed by English and French. The number of visitors and visits is increasing since June 2013. The mentioning of the website "www.unio.lu" at every event and in every publication will help to increase the number of visits.

### ➤ Realised

Website in three languages realised and news or documents added +/- 12 times a year.

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |          |     |          | 2014 |          |     |          | 2015 |          |     |          | 2016 |          |     |          | 2017 |         |     |         |
|----|------|----|-----|----|------|----------|-----|----------|------|----------|-----|----------|------|----------|-----|----------|------|----------|-----|----------|------|---------|-----|---------|
|    | I    | II | III | IV | I    | II       | III | IV       | I    | II       | III | IV       | I    | II       | III | IV       | I    | II       | III | IV       | I    | II      | III | IV      |
| E3 |      |    |     |    |      | planned  |     | planned  |      | planned  |     | planned  |      | planned  |     | planned  |      | planned  |     | planned  |      | planned |     | planned |
|    |      |    |     |    |      | realized |     | realized |      | realized |     | realized |      | realized |     | realized |      | realized |     | realized |      |         |     |         |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

**5.1.20 Action E4: Organisation de séminaires**

To promote the scientific exchange with other Life projects or other scientists working in the same field, two scientific seminars are planned within the project.

➤ **Progress/results**

The first seminar about the rearing of unionoid mussels was organized in the last week of November 2015 and was with 81 participants from 20 countries a success (see progress report II).

As discussed during the last project visit and due to the extended project runtime we plan to organize the second seminar in November 2018. The topic of the second seminar will focus on habitat restoration and monitoring. From all the experience with the organisation of scientific seminars we know that we need a lead time of about 1 year. Our plan is to start announcing and preparing the seminar by the end of 2017.

➤ **Realised**

The first seminar about the rearing of unionoid mussels was held from Tuesday 24th November - Friday 27th November 2015.

81 participants from 20 countries, 27 oral presentations and 22 poster presentation, visit of the rearing facility at the mill of Kalborn.

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is changed as discussed in the midterm report.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| E4 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

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|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

### 5.1.21 Action F1: Gestion et encadrement du projet

#### ➤ Progress/results

##### Project management staff till December 2016:

Coordinator 60%: Alexandra Arendt biologist

Scientific 1 50%: Frankie Thielen Dr.rer.nat.

Scientific 2 50%: Sonja Heumann Dr. tech.

Technician 100%: Karin Michels environmental technician

Employee 20% Tanja Eybe

Secretary/accountancy 40%: (LIFE 11 NAT/LU/857) 20%: (LIFE 11 NAT/LU/858) 20%: (LIFE 13 NAT/LU/ 782): Patricia Heinen secretary

##### Project management staff from January 2017:

Coordinator 70%: Sonja Heumann Dr. tech.

Scientific 1 50%: Frankie Thielen Dr.rer.nat.

Scientific 2 100% No Name

Employee 20% Tanja Eybe biologist

Technician 100%: Karin Michels environmental technician

Secretary/accountancy 40%: (LIFE 11 NAT/LU/857) 20%: (LIFE 11 NAT/LU/858) Patricia Heinen secretary

##### Piloting committee

Our fifth meeting of the piloting committee took place on 14.12.2016. The action status has been presented, as well as solved resp. unsolved problems.

##### Project prolongation

A request for a project prolongation and financial transfer has been introduced to the European Commission in Mai 2015. A project prolongation till 28.02.2019 has been accepted.

#### ➤ Realised

Report and presentation of the 5<sup>th</sup> piloting committee (see Annex 20).

➤ **Problems encountered/delays**

No other problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |  |  |  |  |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|--|--|--|--|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |  |  |  |  |
| F1 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |  |  |  |  |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |  |  |  |  |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

### 5.1.22 Action F2: Echange du savoir avec d'autres projets: LIFE et autres

The intent of this action is the regular exchange with all other project (Life, but also others) working in the field of freshwater mussel conservation. This achieved by attending scientific meetings and regular email exchange with other experts.

#### ➤ Progress/results

During the report period we attended the following scientific seminars or participated in the following scientific committees.

- **01 & 02.02.2016:** Participation as member of the advisory board of the "Verbundprojekt-Umsetzung regionaler Schutzmaßnahmen und Entwicklung eines neuen überregionalen Artenschutzkonzeptes für die nationalen Verantwortungsarten: Flussperlmuschel (*Margaritifera margaritifera*) und Malermuschel (*Unio pictorum*) - ArKoNaVera" on the first scientific committee in Dresden, Germany
- **28.-30.09.2016:** International river restoration conference. Restoring floodplains, habitats and connectivity - using mussels and brains. Lund, Sweden, September 28-30.2016. Oral presentation (Annex 21) Frankie Thielen: Reintroduction of freshwater mussels in the Ardennes. Participation of the whole LIFE Unio-Team
- **14.10.2016:** Participation at the scientific colloquium from natur & ömwelt with the theme: Ökosystemdienstleistungen - Der Nutzen der Natur für den Menschen, Echternach, Luxembourg.
- **01 & 02.02.2017:** Participation as member of the advisory board of the "Verbundprojekt-Umsetzung regionaler Schutzmaßnahmen und Entwicklung eines neuen überregionalen Artenschutzkonzeptes für die nationalen Verantwortungsarten: Flussperlmuschel (*Margaritifera margaritifera*) und Malermuschel (*Unio pictorum*) - ArKoNaVera" on the second scientific committee in Dresden, Germany Oral presentation Frankie Thielen: What do juvenile mussels eat?
- Participation at the "Conseil supérieure de la pêche" Luxembourg

In combination with the participation at the scientific program of the river restoration conference in Lund Sweden, we also participated at the official excursion on Friday, September 30 and got an extra private excursion on Saturday, October 1<sup>st</sup> to two more restoration sites (Figure 17 & 18) of the ucforLIFE project (<http://www.ucforlife.se/en/>). Overall 4 restorations sites were visited (River Bräkneån, river Klingavälsån, river Mörrumsån and river Fyleån).





Figure 21: Bypass installed at the river Bräkneån



Figure 22 Nilsson Andreas from the ucforLIFE project gives explanations about future restoration work

Regular email exchange and other contacts were also in 2016 ongoing with the following projects and experts and also two new projects (ArKoNaVera, LIFE Haute Dronne):

- UC for Life Sweden (<http://www.ucforlife.se/en/>).
- LIFE+ Project Margal-Ulla Galicia Spain (<http://margalulla.xunta.es/en>).
- LIFE+ France « Rivières vivantes de Bretagne et de Normandie : Mobilisation pour le retour de la moule perlière d'eau douce » (<http://www.life-moule-perliere.org/accueilmoule.php>).
- Austrian Freshwater Pearl Mussel Project (<http://www.flussperlmuschel.at>)
- Rachel Mair White Sulphur Springs National Fish hatchery (<http://www.fws.gov/northeast/wssnfh/>).
- Prof. Dr. Chris Barnhart, Missouri State University (<http://courses.missouristate.edu/ChrisBarnhart/home/Default.htm>).
- Megan Bradley Aquatic Wildlife Conservation Center, Marion, Virginia, see also action A4 (<http://www.dgif.virginia.gov/awcc/>)
- Jürgen Geist group TU München (<http://fisch.wzw.tum.de>).
- Heidi Sehlheim, Charlotte Bontinck and Grégory Motte, Projekt Habitat Euregio + Biologische Station Aachen, Parc naturel hautes fagnes (<http://www.euregio-mr.com/de/service/archiv/2010/das-projekt-201ehabitat-euregio201c>).
- Arno Schwarzer ECOLOGIS( <http://www.ecolo-gis.de> )
- Verbundprojekt- Umsetzung regionaler Schutzmaßnahmen und Entwicklung eines neuen überregionalen Artenschutzkonzeptes für die nationalen Verantwortungsarten: Flussperlmuschel (*Margaritifera margaritifera*) und Malermuschel (*Unio pictorum*) - ArKoNaVera (<http://www.flussmuscheln.de>)
- LIFE+ Project LIFE - Haute Dronne (<http://www.life-haute-dronne.eu/preservation-de-la-moule-perliere>)

## ➤ Realised

See above

Progress Report III

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| F2 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

**5.1.23 Action F3: Plan de conservation After-LIFE**

Action to install a afterlife program

➤ **Progress/results**

For both project sites the Natura 2000 areas' priorities and measures are defined very precisely in the management plans worked out under A5 where the Life Unio team contributed (see annex under A5/7.2.1 Aue &Wasser: Operative Maßnahmen 2016-2026). Clear objectives and figures are given for each section of the rivers and for the tributaries as well, so that this information deliver a good base for the future After-Life conservation plan.

➤ **Realised**

No deliverables are foreseen for the moment.

➤ **Problems encountered/delays**

No problems encountered so far.

The time plan for this action is on schedule.

|    | 2012 |    |     |    | 2013 |    |     |    | 2014 |    |     |    | 2015 |    |     |    | 2016 |    |     |    | 2017 |    |     |    |
|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|------|----|-----|----|
|    | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV | I    | II | III | IV |
| F3 |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |
|    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |      |    |     |    |

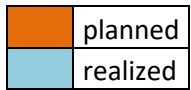
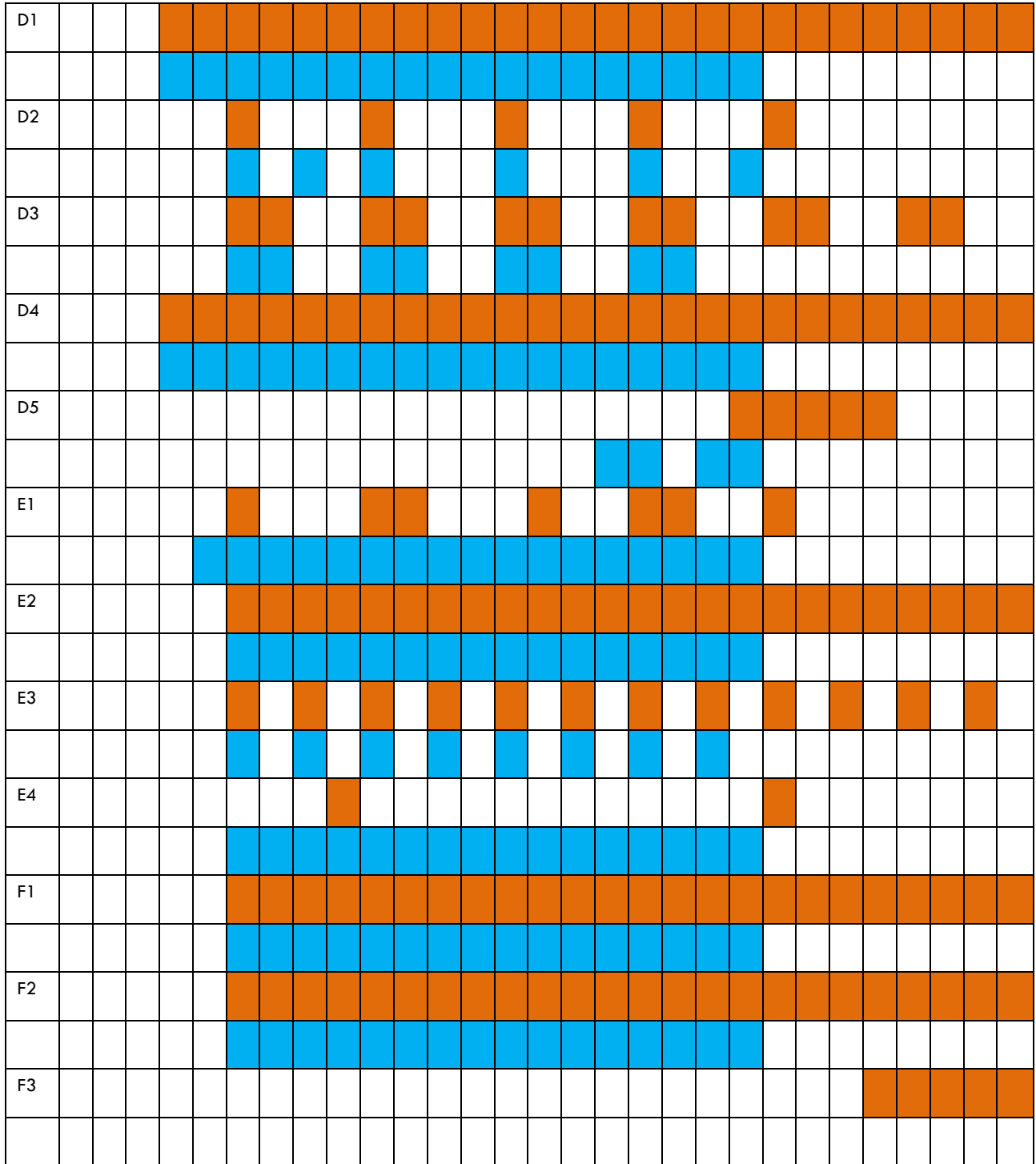
|  |          |
|--|----------|
|  | planned  |
|  | realized |

➤ **Complementary action outside LIFE**

None.

## 5.2 Overall Timetable

|    | 2012 |   |   |   | 2013 |   |   |   | 2014 |   |   |   | 2015 |   |   |   | 2016 |   |   |   | 2017 |   |   |   | 2018 |   |   |   | 2019 |   |
|----|------|---|---|---|------|---|---|---|------|---|---|---|------|---|---|---|------|---|---|---|------|---|---|---|------|---|---|---|------|---|
|    | -    | = | ≡ | ≥ | -    | = | ≡ | ≥ | -    | = | ≡ | ≥ | -    | = | ≡ | ≥ | -    | = | ≡ | ≥ | -    | = | ≡ | ≥ | -    | = | ≡ | ≥ |      | - |
| A1 |      |   | ≡ | ≥ | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |
|    |      |   | ≡ | ≥ | ≡    | ≥ |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |
| A2 |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |
|    |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |
| A3 |      |   | ≡ | ≥ | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |
|    |      |   | ≡ | ≥ | ≡    | ≥ |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |
| A4 |      |   | ≡ | ≥ | ≡    | ≥ |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |
|    |      |   | ≡ | ≥ | ≡    | ≥ |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |
| A5 |      |   |   |   |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |   |   |      |   |
|    |      |   |   |   |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |
| B1 |      |   | ≡ | ≥ |      |   |   |   | ≡    | ≥ |   |   |      |   |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |
|    |      |   | ≡ | ≥ |      |   |   |   | ≡    | ≥ |   |   |      |   |   |   | ≡    | ≥ |   |   |      |   |   |   |      |   |   |   |      |   |
| C1 |      |   |   |   |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |
|    |      |   |   |   |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |
| C2 |      |   |   |   |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |
|    |      |   |   |   |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |
| C3 |      |   | ≡ | ≥ |      |   |   |   | ≡    | ≥ |   |   |      |   |   |   | ≡    | ≥ |   |   |      |   |   |   | ≡    | ≥ |   |   |      |   |
|    |      |   | ≡ | ≥ |      |   |   |   | ≡    | ≥ |   |   |      |   |   |   | ≡    | ≥ |   |   |      |   |   |   | ≡    | ≥ |   |   |      |   |
| C4 |      |   | ≡ | ≥ | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |
|    |      |   | ≡ | ≥ | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |
| C5 |      |   | ≡ | ≥ |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |
|    |      |   | ≡ | ≥ |      |   |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |   |   | ≡    | ≥ |



## 5.3 Impact

### Nature & Biodiversity

In the river Our and Sûre valley the fencing activities (1,6 km) showed a reduction of the turbidity in the respective streams (Roupelsbaach and Folkesbur, Annex 13). Although these are only preliminary results, this is a positive development as it shows that the amount of fine sediments being washed into the main streams, holding the mussel population, is reduced. On the other hand, vegetation in accordance to the location can grow and can act as an ecological corridor.

In both rivers the dumping of gravel helped to create new gravel banks in the main streams. Although redox measurements showed that these newly created gravel banks tend to clog again, they can still be used by the most important host fish *Phoxinus phoxinus* as spawning ground. Approximately 500 to 700 m<sup>2</sup> of gravel banks were created in the river Our and the river Sûre.

The removal of one more migrating obstacles in the Schwärzerbaach reconnected the last km of this tributary with the main stream Sûre. One obstacle in the stream Ruederbaach was removed and so 1 km stream was reopened for the fish migration.

The installation of water evacuation grids reduced the income of fine sediments from forestry roads (4,2 km) into the small streams. Thereby the interstitial can be used as a spawning area for different fish species.

The rearing activity produced so far around 1.200 mussels from the river Our and 1.200 from the river Sûre. If these mussels are released, the "observed" Our population will be increased by 30% and the "observed" population in the river Sûre by 50%. In summer time, one single adult *Unio crassus* can filter up to 20 Liter of water per day. Increasing the populations in both rivers with more than 1.000 individuals will therefore increase the self-purification capacity of both rivers. However we will still be far away from the former strong mussel population. But this is a good start anyway.

### Indirect impacts

The good contact with the local municipality from Clervaux and their knowledge about our LIFE *Unio* project helped to develop a plan to remove and transform the pipe construction under the road entering the camping site at Tintesmillen. This action reconnected the small stream Feierbech again with the river Our and the cost connected to this project are covered outside the LIFE project. The pipe is already removed and a bridge built. There will be additional work for renaturation of the riverbed in March 2017. There are no costs for LIFE *Unio*.

In our "Pilotproject Feierbech" we are in close contact with some of the local farmers due to the regular meetings and exchange about the results of the soil and water samples. The farmers get to a greater extent interested in the target species, the thick shelled river mussel (*Unio crassus*) as they ask more and more questions about the well doing of the mussels. We think that this is a good development as people only tend to protect what they know.

Some local fisherman got motivated to also trap the signal crayfish which might help to reduce the numbers of this invasive species. It is allowed to catch the signal crayfish in the river Our between April 1<sup>st</sup> and December 31 with a national fishing license. During this time period there are no limitations in number and size to trap the signal crayfish.

The Administration of Water wants to improve the knowledge in the employment about *Unio crassus*. People of the Administration should know about the specie and their habitat to protect it. They asked for a map where the populations are signed. This should help to plan, organize and to permit construction sites next to the river Our and Sûre.

A mentioned in E2 the amount of visitors is increasing. These people learn about rare species and the possibilities to protect them. Knowledge and information is necessary for the people to be able to change their behavior.

## 5.4 Outside LIFE

- After removal of the big pipe at Schwärzerbaach the stream damaged the riverbed during a small flood. The Administration of Nature reconstructed the riverbed. Further erosion of the riverbed was stopped.
- The Administration of Nature builds another bridge in a tributary of Ruederbaach to remove a ford.
- Building of 500 m a fence on a tributary of the brook Traesbech - The measure has been planned by the Biological Station of the Natur Park Our together with the Life team and financed by the community Parc Housen, see plan under Annex 7
- Restoration of the riverbed (Feierbech) - The total amount of the restoration of the Feierbech riverbed, the transformation of the fish obstacle and the adaption of the access to the camping "Tintsmillen" were about 55.000 €. The transformation has been finished December 2016.
- Sponsoring by Rosport Mineralwater for 5.000€/ 2017 and bottled mineral water for visitors and schools
  - CFL (Chemins de Fer Luxembourgeois) – sponsoring of 2.500€
  - With the help of the sponsoring from the HSBC bank (see also action E2, progress report II) we were able to buy in 2016 more and better optical equipment and some other didactical material (see also 5.1.18, action E2 point 7).



## 6 FINANCIAL PART

### 6.1 Costs incurred

| SUMMARY OF COSTS INCURRED           |   |   |  |                  |
|-------------------------------------|---|---|--|------------------|
| Project Costs Incurred (27/01/2017) |   |   |  |                  |
| Cost Category                       | Budget according to the grant agreement | Budget total 09.2012-28.02.2019 after AMENDMENT signed 28.07.2016 | Costs incurred within the project duration | % of total costs |
| Personnel                           | € 1.089.312,00                          | € 1.176.240,00  | € 756.579,37                               | 64%              |
| Travel                              | € 38.049,00                             | € 38.049,00   | € 15.763,92                                | 41%              |
| External assistance                 | € 272.100,00                            | € 272.100,00  | € 135.790,97                               | 50%              |
|                                     |   |   |  |                  |
| Durable goods - Equipment           | € 222.100,00                            | € 212.172,00  | € 175.014,09                               | 82%              |
| Land/rightspurchase/lease           | € 81.600,00                             | € 81.600,00   | € 63.954,16                                | 78%              |
| Consumable material                 | € 31.939,00                             | € 31.939,00   | € 14.642,01                                | 46%              |
| Other direct costs                  | € 238.413,00                            | € 161.413,00  | € 104.000,40                               | 64%              |
| Overheads                           | € 83.555,00                             | € 83.555,00   | € 58.893,60                                | 70%              |
| <b>TOTAL</b>                        | <b>€ 2.057.068,00</b>                   | <b>€ 2.057.068,00</b>   | <b>€ 1.324.638,53</b>                      | <b>64%</b>       |

Spending rate of cost categories lays between a minimum of 41% (travel) and a maximum of 82% (durable goods) for the new project runtime of about 64%.

**Personnel costs:** The transfer of 86.928 € to "Personnel costs" from the categories "Other costs" (77.000€) and "Durable goods" (9.928€) and the prolongation of the project till February 2019 (see amendment 28.07.2016) will allow us to finalize successfully the implementation of the AM within the foreseen budget.

**Travel:** Though the Life Unio team visited the Swedish LIFE project "Unio crassus for Life" and its international river restoration conference "Restoring floodplains, habitats and connectivity – using mussels and brains" at Grand Hotel, Lund, Sweden in October 2016, there's an underspending of the cost category "Travel" for the moment. The participation to the FMCS Congress in Cleveland (USA) in March will help to reduce this spillover.

**External assistance:** A big part of the budget is dedicated to the transformation of the fish migration obstacles. The costs were lower than estimated as we worked with firms familiar with the type of bridge we needed. There are two more construction sites that need to be done. Another expensive measure is the installation of water evacuations grids and fences. If it is within the margin of the budget possible, we propose to carry out more measures than foreseen (i.e. evacuation grids, fencing, etc.). These measures are essential to improve the conservation status of the target species in a significant way. These additional costs can be carried out within the foreseen budget.

**Durable goods - Equipment:** The biggest expenditure in this period was the installation of water evacuations grids next to Feierbech and Hengeschterbaach. Because of the construction of windmills the local municipalities were able to reconstruct the forestry roads and we could install the grids. The setup of the Natura 2000 visiting room was another big item in the last period. Information material and furniture were installed and the room was ready for the public in October 2016.

**Land purchase:** There is a small underspending in this action because we already purchased 7,9 ha out of 8,0 ha foreseen (98% of the foreseen area) with 78% of the budget. We will go on with the purchase of land.

**Consumable material:** This category is low, but as it is a small budget it can be counterbalanced by other categories if necessary.

**Other direct costs:** After a large underspending of the category "Other costs" in the past for the reason mentioned in the letter send to CE in June 2016, the budget is actually well balanced for the following reasons: In order to increase our knowledge about parameters being able to counter the mussel release we relocated a part of the budget (about 20.000€) for pesticide analyses (email from Simon Goss to Alexandra Arendt 03.06.2016). Furthermore 77.000€ were transferred to the category "Personal costs".

**Overheads:** This category is balanced.

With 64% of expenditure we are balanced. In case of financial surplus we will carry out additional measures essential to the conservation status of the target species, following specific actions as mentioned in the Grant Agreement. If some actions are outside the initial scope a prior request will be sent to the EC before implementation.

## 6.2 Action detail

| Action number and name   | Foreseen cost according to the grant agreement | Foreseen cost after AMENDMENT signed 21.07.2016 | Spent so far          | Remaining           |
|--|--|---|-----------------------|---------------------|
| Action A: Preparatory actions, elaboration of management plans and/ or of action plans                                 |  |   |                       |                     |
| A1   | 21.065,00 €                                    | 21.065,00 €                                     | 14.021,44 €           | <b>7.043,56 €</b>   |
| A2   | 41.679,00 €                                    | 41.679,00 €                                     | 17.095,59 €           | <b>24.583,41 €</b>  |
| A3   | 53.745,00 €                                    | 43.817,00 €                                     | 39.132,07 €           | <b>4.684,93 €</b>   |
| A4   | 27.302,00 €                                    | 27.302,00 €                                     | 17.293,87 €           | <b>10.008,13 €</b>  |
| A5   | 19.999,00 €                                    | 19.999,00 €                                     | 13.477,88 €           | <b>6.521,12 €</b>   |
| Action B: Purchase/ lease of land and/ or compensation payments for right use  |  |   |                       |                     |
| B1   | 99.679,00 €                                    | 99.679,00 €                                     | 76.098,51 €           | <b>23.580,49 €</b>  |
| Action C: Concrete conservation actions  |  |   |                       |                     |
| C1   | 124.578,00 €                                   | 128.802,00 €                                    | 68.764,94 €           | <b>60.037,06 €</b>  |
| C2   | 131.152,00 €                                   | 131.152,00 €                                    | 75.025,25 €           | <b>56.126,75 €</b>  |
| C3   | 58.562,00 €                                    | 58.562,00 €                                     | 48.327,47 €           | <b>10.234,53 €</b>  |
| C4   | 527.770,00 €                                   | 522.874,00 €                                    | 360.465,54 €          | <b>162.408,46 €</b> |
| C5   | 7.917,00 €                                     | 9.837,00 €                                      | 6.095,38 €            | <b>3.741,62 €</b>   |
| Action D: Monitoring of the impact of the project actions (obligatory only if there are concrete conservation actions) |  |   |                       |                     |
| D1   | 125.884,00 €                                   | 82.580,00 €                                     | 46.577,83 €           | <b>36.002,17 €</b>  |
| D2   | 28.802,00 €                                    | 28.802,00 €                                     | 18.898,84 €           | <b>9.903,16 €</b>   |
| D3   | 34.583,00 €                                    | 38.999,00 €                                     | 27.233,97 €           | <b>11.765,03 €</b>  |
| D4   | 27.856,00 €                                    | 33.184,00 €                                     | 12.541,02 €           | <b>20.642,98 €</b>  |
| D5   | 14.107,00 €                                    | 14.107,00 €                                     | 0,00 €                | <b>14.107,00 €</b>  |
| Action E: Public awareness and dissemination of results (obligatory)   |  |   |                       |                     |
| E1   | 36.292,00 €                                    | 36.292,00 €                                     | 20.953,20 €           | <b>15.338,80 €</b>  |
| E2   | 115.422,00 €                                   | 121.470,00 €                                    | 81.375,83 €           | <b>40.094,17 €</b>  |
| E3   | 20.821,00 €                                    | 24.277,00 €                                     | 16.649,95 €           | <b>7.627,05 €</b>   |
| E4   | 28.774,00 €                                    | 28.774,00 €                                     | 15.238,32 €           | <b>13.535,68 €</b>  |
| Action F: Overall project operations and monitoring of progress (obligatory)   |  |   |                       |                     |
| F1   | 348.039,00 €                                   | 374.247,00 €                                    | 235.103,15 €          | <b>139.143,85 €</b> |
| F2   | 79.485,00 €                                    | 86.013,00 €                                     | 55.374,88 €           | <b>30.638,12 €</b>  |
| F3   | 0,00 €   | 0,00 €  | 0,00 €                | <b>0,00 €</b>       |
| Overheads  | 83.555,00 €                                    | 83.555,00 €                                     | 58.893,00 €           | <b>24.662,00 €</b>  |
| <b>Total</b>   | <b>2.057.068,00 €</b>                          | <b>2.057.068,00 €</b>                           | <b>1.324.637,92 €</b> | <b>732.430,08 €</b> |

## 7 ANNEXES

All annexes as listed in the text above can be found in the extra Annex document.

### **Annex 1** - Action A4 : Mise en place de la technique d'élevage pour Unio crassus

- Rearing protocoll in English

### **Annex 2** - Action A5 : Contribution à l'élaboration des plans de gestion Natura 2000 "Our" et "Haute Sûre"

- Management plan Our: plan de gestion version abrégée (definitive version)

### **Annex 3** - Action A5 : Contribution à l'élaboration des plans de gestion Natura 2000 "Our" et "Haute Sûre"

- Management plan Sûre: plan de gestion version abrégée (definitive version)

### **Annex 4** - Action B1: Acquisition de terrains le long de l'Our, de la Sûre et de leurs affluents

- Land purchase, notarial act, aerial photo with the localisation of the acquisitions, explanation of QD concept and small measures

### **Annex 5** - Action C1: Interventions pour réduire l'apport en sédiments fins dans le réseau hydrographique

- Demonstration Project "Feierbech".

### **Annex 6** - Action C1: Interventions pour réduire l'apport en sédiments fins dans le réseau hydrographique

- Restoration of the river bed on lower part of the Feierbech.

### **Annex 7** - Action C1: Interventions pour réduire l'apport en sédiments fins dans le réseau hydrographique

- Fencing of the brook Traesbech

**Annex 8 - Action C2: Transformation d'obstacles à la migration sur les cours d'eau tributaires**

- Removal of the third tube Schwärzerbaach/ Sûre

**Annex 9 - Action D1: Surveillance de la qualité de l'eau et du substrat interstitiel**

- Measurements of the rivers, their tributaries and other data of the water quality

**Annex 10 - Action D1: Surveillance de la qualité de l'eau et du substrat interstitiel**

- Hydro peaking at the river Our (German)

**Annex 11 - Action D2: Monitoring des poissons hôtes**

- Authorization to conduct electric fishing in the river Our, river Sûre and tributaries

**Annex 12 - Action D3: Suivi de *Unio crassus* dans son milieu naturel**

- Sediment analysis of the riverbed next to the mussels

**Annex 13 - Action D4: Monitoring et évaluation de l'impact des mesures concrètes**

- Monitoring of the measures impact

**Annex 14 - Action D5: Analyse de l'impact socio-économique du projet et de l'effet sur les écosystèmes**

- Offer and working plan

**Annex 15 - Action E1: Information et sensibilisation des acteurs concernés**

- Meetings with stakeholders

**Annex 16 - Action E2: Sensibilisation du grand-public**

- List of visitors

**Annex 17** - Action E2: Sensibilisation du grand-public

- Press releases

**Annex 18** - Action E2: Sensibilisation du grand-public

- Notice board

**Annex 19** - Action E2: Sensibilisation du grand-public

- Pictures of the Natura 2000 room

**Annex 20** - Action F1: Gestion et encadrement du projet

- Report and presentation of the 5<sup>th</sup> piloting committee

**Annex 21** - Action F2: Echange du savoir avec d'autres projets: LIFE et autres

- Oral Presentation of Frankie Thielen in Schweden